DOCUMENT RESUME

ED 040 355 AC 008 151

TITLE	Sanitary Food Service; Instructor's Guide to Be Used in Training Food-Service Personnel.
INSTITUTION	Public Health Service (DHEW) Cincinnati, Ohio. Consumer Protection and Environmental Health Service.
PUB DATE	69
NOTE	127p.: 1969 revision
AVAILABLE FROM	Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (0-351-152, $1.50)
EDRS PRICE	EDRS Price MF-$0.50 HC Not Available from EDRS.
DESCRIPTORS	Bibliographies, Disease Control, Dishwashing, *Food Service Workers, Hygiene, Instructional Aids, *Lesson Plans, Periodicals, Program Planning, *Sanitation, *Teaching Guides, Teaching Techniques, *Training, Transfer of Training

ABSTRACT

Instructors of civilian and/or military food service employees are given suggestions for the flexible use of this guide, then receive more detailed guidelines for grouping trainees, managing classes, planning lessons, and adapting the food service course to various groups and teaching situations. Specific content (principles to be taught) and lesson plans are outlined on the food service industry and training needs; microbiology and foodborne disease; methods of preventing foodborne disease; personal hygiene, self-protection, and salesmanship (service to patrons); proper methods of washing and sanitizing utensils and equipment; insect and rodent control; housekeeping and waste control practices; and followup training, including application of what has been learned. Appendixes cover training principles and techniques, instructional aids and their use, and steps in organizing and promoting a food service employee training program, followed by a bibliography and a list of periodicals. (Author/LY)

PRINTED BY THE STANDARD REGISTER COMPANY, U. S. A.
FORM 0801

AC008151

Department of the Army Technical Manual TM 8-525
Department of the Navy Publication NavMed P-1333
Department of the Air Force Manual AFP 161-22

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

ED0 40355

SANITARY FOOD SERVICE

Instructor's Guide

1969 REVISION

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Consumer Protection and Environmental Health Service
Cincinnati, Ohio

AC 008151

DEPARTMENTS OF THE ARMY, THE NAVY, AND THE AIR FORCE

INSTRUCTOR'S GUIDE

To Be Used in Training Food-Service Personnel

ED0 40355

SANITARY FOOD SERVICE

1969 Revision

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Consumer Protection and
Environmental Health Service
Environmental Control Administration
Cincinnati, Ohio
1969

PUBLIC HEALTH SERVICE PUBLICATION NO. 90

Also issued as joint Army, Navy, and Air Force publication
TM 8-525/NAVMED P-1333/AFP 161-22

(Supersedes AFM 146-7, 4 Sep 56)

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402 Price $1.50

FOREWORD

The original "Instructor's Guide—Sanitary Food Service" was jointly published in 1952 by the U.S. Public Health Service and the Departments of the Army, the Navy, and the Air Force. It proved valuable in assisting State and local health departments and the military in providing information as to methods and materials that may be used in conducting food service classes.

Much of the technical material covered in that publication eventually became obsolete. The material in the earlier edition was based largely on the 1943 recommendations of the Public Health Service; the technical portions in this document are based on the *Food Service Sanitation Manual,* 1962 Recommendations of the Public Health Service. Those familiar with the earlier edition will note that the format has been changed. Part III has been written to show the development of the Lesson Plan, the Lesson Manuscript, and the Lesson Questions. It is not expected nor desired that the prospective instructors will utilize the lessons as written. The lessons are merely illustrative and may be used as a source of information, along with other texts or articles, as a basis for the instructors to develop their own materials. The instructors may be health department staff members, military personnel, or members of the food service industry.

Because there are so few current films and film strips available, and because such visual aids soon become outdated, no attempt has been made to list them by title. The use of visual aids is an important adjunct to training, however, and the instructor is encouraged to develop his own slides, posters, or other graphic materials. Just because they are not commercially produced does not mean they are not useful. Some of the best visual aids that can be used are local in nature, developed to point out a particular problem.

The advantages of food service sanitation training should be obvious to all. For the industry, the more well trained the employee, the less chance there is of food contamination and food waste because of poor storage and handling practices: business increases because of cleaner, better service to the customer. The employee benefits from a more pleasant place to work and a greater income from tips. The health department benefits since trained workers will understand the reasons for good sanitation practices and, through understanding, will be more alert to the correction of possible health hazards.

The major part of this manual has been written by Frank W. Mackison, Senior Sanitarian, U.S. Public Health Service. He was assisted significantly by the military, particularly Major Lee C. Herwig, Jr., U.S. Army; Major Amos Townsend, M.D., U.S. Air Force; and Lieutenant Commander Samuel H. Barboo, U.S. Navy.

Other contributors from the U.S. Public Health Service, State and local heath departments, other Federal agencies, educational institutions, and the food service industry are far too numerous to mention by name. Without their able assistance in reviewing and commenting on drafts of this publication, the preparation of a volume such as this would have been much more difficult.

CONTENTS

Page

Part I. Introduction—and How to Use This Guide 1

Part III. The Guide 5

Part II. Conducting the Course 13

Lesson One:

Importance and Magnitude of the Food Service Industry and the Need for Food Service Workers' Training 15

Lesson Two:

Microbiology and Foodborne Disease 23

Lesson Three:

Methods for the Prevention of Foodborne Disease 35

Lesson Four:

Personal Hygiene, Self-Protection, and Salesmanship 49

Lesson Five:

Proper Methods of Washing and Sanitizing Utensils and Equipment 57

Lesson Six:

Insect and Rodent Control 73

Lesson Seven:

Housekeeping and Waste Disposal Practices 83

Lesson Eight:

Follow-up Training and Application of What Has Been Learned . . 93

Part IV. Appendices 99

Appendix A. Principles of Learning and Methods and Techniques of Teaching 101

Appendix B. Instructional Aids and Their Use 111

Appendix C. Organizing and Promoting a Food-Service Employees Training Program 119

Appendix D. Bibliography 125

PART I

Introduction—and How To Use This Guide

Need for Food Service Employee Training Programs

The food and beverage service industry ranks fourth in size among all the industries of the Nation. Food and beverage service establishments associated with this industry employ nearly three million persons. Annually approximately 75,000 new persons are added to this number to fill newly created jobs. An average of 80 million meals are served daily in the Nation's various types of food and beverage establishments. Changes in the way we live have increased the popularity, as well as the necessity, of eating away from the home. The increased employment in our business and metropolitan centers, distance from job to home, increased employment of women, and the mobility of our population are factors contributing to increased patronage of food service establishments. The food service industry, through advertisements and promotional work, increasingly seeks to make the public more aware of attractive, nutritious, and tasteful food available in its establishments. Also, institutional feeding has grown tremendously in recent years.

Within the Armed Forces, also, the food service program is of tremendous magnitude. The budget for subsistence to feed our enlisted men alone runs well over a billion dollars a year. The combined programs within the Department of Defense are 3½ times larger than the largest civilian restaurant organization, and 4½ times larger than the school lunch program. There are over 5,300 dining halls and more than 100,000 employees serving over 5 million meals a day. Meals are served often around the clock in many varied situations: during combat, in hospitals, aboard ship, on submarines, in flight, and in orbit.

Although by far the greatest part of food served today is safe for consumption, there is ample evidence to indicate that foodborne illness is not being adequately controlled. A number of factors can contribute to occurrence of an outbreak of foodborne illness.

Many time honored food preparation techniques have not changed and are still applicable today, but food establishments have increased in size, kind, and number, and there have been significant changes in food preparation and distribution techniques. As processes and methods of food preparation have changed, new problems in food protection have arisen.

With today's trend toward industrial catering and centralized food preparation, whereby food prepared in a single, centrally located kitchen may be served to large numbers of persons in industrial plants, schools, and commercial food service establishments, at widespread locations, it becomes apparent that a momentary breakdown of equipment or lack of application of food protection principles can result in illness to many individuals.

Unfortunately, food can be easily contaminated and has the potential to support the growth of disease-producing organisms, some of which produce bacterial enterotoxins. Food may also serve as the vehicle for the transmission of toxic contaminants. Thus, it is essential that hygienic principles be applied continuously at all points along the food chain if the consumer is to receive the protection to which he is entitled.

The "human element" continues to be the single most important factor in the control of foodborne illness. Food service workers play a major role in the prevention and control of outbreaks of foodborne illness.

There are many food service workers who know and conscientiously apply the hygienic principles of food protection; however, many workers do not appreciate the need for these principles. Ample evidence of this can be found by observing employees at work in food establishments. In addition, new workers constantly enter the field of food service. It has long been recognized that the turnover of employees in the food and beverage industry is great; new employees enter the field to temporarily fill existing vacancies and soon leave for employment in other fields. This is especially true of younger age groups. These new employees are generally unaware of the principles of food protection.

The evidence of foodborne illness and the advancements in food technology, indicate that the food service industry and public health agencies are not fulfilling their responsibility to see that those persons processing, preparing, and serving food to the consuming public are adequately trained to do that job in a completely hygienic manner.

Purpose of Food Service Employee Training Programs

A major objective of a food service employees training program is the protection of the consumer's health. The training program must be designed to provide the employee with the reasons for certain food protection requirements. By understanding the reason why a practice is required, the employee should be more willing to accept and apply that practice on a day-to-day basis. Forced compliance, although necessary under specific circumstances, frequently brings only momentary and short-lived improvement.

A food service employee's training program should not be considered an addition to the restaurant sanitation program, but should be an integral part of it, for it is only by continuous in-service training that the job can be accomplished.

Scope of Food Service Employee Training Programs

The training program should be designed to provide training for all personnel engaged in preparing or serving food to the public. This would include those persons employed in kitchens, commissaries, and similar areas used for the preparation of food for service to the consumer. Although managerial personnel may not always be engaged in preparing or serving food, they should be invited to participate in the development and implementation of training courses.

Because all aspects of food sanitation problems receive attention, training should not be confined to employees of food service establishments alone, but should be provided for persons operating mobile vending vehicles, vending machine service routes, and personnel delivering potentially hazardous foods. Food service personnel in institutions such as nursing homes, county homes, schools, hospitals, churches, and private clubs should also be included when planning training courses.

Basically, it is management's responsibility to train employees in the proper performance of their job. It is the responsibility of the health agency, however, to provide management with assistance in training food service workers to know and appreciate food protection principles. This assistance may take the form of actually planning and presenting the course, or presenting specific topics of a course, or simply acting in the capacity of a resource person for management in the planning of a course.

The number and type of training courses to be presented will vary with the community, depending upon the number and types of establishments or places serving food to the public in the community. In small communities having predominantly commercial establishments, a course would include all personnel engaged as food service employees and would cover all the basic principles of food protection. Special courses can also be presented to cover individual problems such as dishwashing, proper handling of single service articles, food vending machines, mobile vending, and mobile food vending services.

In larger communities, the basic principles may be presented on an as-needed basis for existing establishments and for new establishments before they open for business. There may also be a need to present more specialized courses covering specific topics of the basic principles. For example, if a number of establishments are having problems relating to the proper washing and sanitizing of equipment and utensils, insect and rodent control, or similar specific areas, a short training course could be presented for the persons directly concerned or responsible for these areas of sanitation.

The lesson plans and the lesson manuscripts presented in this Instructor's Guide are designed to permit flexibility so the material can be applied to a wide range of food protection programs, to the problems inherent in the programs, and to the type of course being conducted. They can be adapted and supplemented to design a variety of courses that present basic and specific principles of food protection to the food service industry.

USING THE GUIDE

First

Familiarize yourself with the contents of this guide. Many people outstanding in the field of sanitation have taken part in its preparation. You undoubtedly have broad information and experience in the entire field of sanitation and food service employee training needs. With this and the knowledge of the local situation, you will be able to change or adapt this material to best meet the needs of your special groups or community.

Second

This guide has been designed so the instructor may be able to present the material in his own words and avoid the "canned speech" effect that so often results when one reads directly from a prepared text. Instruction is more effective when presented in an informal manner; also, the instructor can more effectively hold the attention of the class and determine more readily the reaction of the group.

Third

Lesson plans have been developed for each of the sessions. Short topical sentences, phrases, or single words have been used in these lesson plans to outline the main points or material that should be covered during the presentation. It is recommended that the instructor develop these main points in his own words and in a method best suited to fill the needs of the community. Lesson manuscripts follow each of the lesson plans and serve to explain each of the points in the lesson plan. These manuscripts have been designed to assist the instructor in the development and presentation of *his own* material.

Fourth

Success in the training of food service employees depends upon a great many considerations, and the method of presentation of the material is a major consideration.

The primary purpose of each session is to present to the food service worker the basic principles of sanitary food service, to show the need for these principles, and to motivate the worker to want to apply proper food sanitation practices. In some cases, the instructor will need to explain major points by the formal lecture method. This type of presentation should be limited whenever possible. Learning can be best accomplished when a variety of teaching techniques and principles are used. For this reason the instructor with limited experience will want to review carefully both Part II and Appendix A of this Guide, which presents techniques and principles of teaching that have been found successful. It is recommended that at least one person in each State be given special instruction in conducting group training of food service employees. The person or persons so trained can then instruct others on how to conduct a food service employee training program.

Purpose of Each Session

The principles to be taught during each session are listed after the title in both the lesson plan and the lesson manuscript. The instructor will want to present, in *his own* words, these principles to the class, since the class should be told at the beginning of each session just what they will be learning during the session. This will let them know in advance the general topics to be discussed and thus make the learning experience more objective and purposeful. In addition, it is easier to stimulate student interest and the desire to learn when one knows what is to be presented. These principles divide the session into broad areas and thereby assist in better organization of the discussion.

Time Allotted for Each Session

Each session may be presented in a 1-hour, in two half-hour, or in some other session sequence suitable to both those being taught and those teaching.

Generally, no session should be longer than 50 minutes unless arrangements are made for a short break midway in the session.

Pass-Out Sheets

Instructors may wish to prepare charts, graphs, pictures, summaries of talks, or other material to illustrate and reinforce specific topics or points made during the training course. Such material can be of great value to the student in reviewing later what has been presented. It is usually advantageous to present each participant with a file folder or an envelope in which they can keep these pass-outs and other material made available during the course. After distributing the pass-out sheets, the points presented in them should be discussed thoroughly. When they have been covered in the class discussion, they should then be reviewed briefly at the end of the session.

PART II

Conducting the Course

4/5

Suggestions to the instructor for

Grouping the trainees
Managing the class
Teaching the sessions
Better instruction

Grouping Food Service Employees for Effective Instruction

The training to be conducted should be considered in terms of what the individual food service employee needs to know to be able to do his job effectively. Because of the large number of persons to be reached in food service employee training and because of limited resources and time, the individual approach does not seem practicable. Therefore, a cooperative analysis of group needs is necessary to determine training needs. This means that the instructor not only should review carefully the establishment(s) inspection reports, but he should also work closely with managerial personnel. In addition, he should spot check with individual workers below the supervisory level to see that they want and need in food sanitation and food service instruction.

After the training needs have been determined, careful consideration should be given to the groupings of food service workers for instructional purposes, bearing in mind that certain parts of this course are applicable to all groups.

Three common types of grouping are mentioned here:

1. Grouping according to position

One of the most important points to be considered when grouping food service personnel for training courses is to group supervisory and nonsupervisory people separately. When this factor is not considered, an unnecessary teaching problem can be created. Food service workers below the supervisory or management level are frequently reluctant to voice their thinking on a subject if there is a chance of embarrassment. On the other hand, the heads of groups, sections, or departments may do "all the talking." When they are considerate enough to remain entirely silent to give the workers below the supervisory level a chance, nobody talks. To be sure, there are instances where mixed groupings can be made without these things occurring, but it usually takes special skills and techniques to make the meeting proceed smoothly and effectively. Experience shows that placing supervisory and nonsupervisory people in the same group has many disadvantages because the interests and needs of the two groups are different.

However, all management personnel should have benefit of the course before it is presented to the employees. Therefore, it is usually wise to arrange for a complete or a summary type course to be presented to such individuals before presenting it to all employees. This not only acquaints the management with the material to be presented, but promotes attendance of employees.

2. Grouping according to specific needs

When, by job analysis, it is possible to determine specific training needs and employees are grouped in accordance with these needs, the basis for a favorable teaching situation is established. Employee participation will be more spontaneous and interest more nearly uniform. Selection and emphasis of material can be "tailor-made." Time can be utilized more effectively.

3. Grouping according to work activity

In areas where a large number of workers are to be trained, there usually will be enough cooks, waiters, chefs, busboys and dishwashers available to enable the instructor to group employees according to special work activities, interests, and experiences. With this type of grouping, the learning process can be speeded up because of sustained group interest. Further, some course content may be eliminated and stress placed on areas important to a specific category of workers.

Size of the Class

Probably the best teaching results will be obtained from a class of 20 to 25 members. With more than this, each group member has little opportunity to take an active part in the discussions and demonstrations, which are necessary elements of this course. A very small group usually does not provide enough experience and variety of ideas to maintain interest.

Selection and Arrangement of the Classroom

When teaching food industry employees, it frequently becomes necessary to use makeshift arrangements such as in establishment dining rooms and meeting halls. The room for the training sessions should be well lighted and ventilated, free from disturbing noise and interruptions, centrally located, and informally arranged.

Instructor's Preparation Before Each Session

The instructor should thoroughly review the material for each unit; prepare any needed teaching notes; arrange for supplementary teaching supplies, materials, visual aids or equipment; and otherwise carefully plan the manner of conducting the session in advance of the meeting of the class. Any indication of lack of preparation or any uncertainty as to how to proceed will have an unfortunate effect upon the group. (See Appendix A).

If an outside speaker is desired for any session, the arrangements must be made considerably in advance of the course. He must be given a definite understanding as to (1) the time he is to speak, (2) the length of his talk, and (3) the material that he is to present. He should understand in advance that his presentation will be in terms of the needs and problems of the class and that the class members will be given an opportunity to ask questions and to discuss his talk.

Since no textbook is available for use by members of the group, the instructor is encouraged to develop material such as charts, graphs, and summaries of talks to aid him in illustrating the principles presented during this course. The 1962 *Food Service Sanitation Manual*, PHS Publication 934, is a valuable reference. He should also review the bibliography in Appendix D and obtain copies of pamphlets, posters, and similar material that may suit his needs. Many companies and firms, as well as Federal, State, and local government agencies, have prepared such material to aid in the training of food service employees. The instructor will want to be continually looking for aids that will be of benefit.

If the instructor does not make regular visits to the establishments of members of his class, he should visit some of their establishments between sessions. Such visits will give him an opportunity to obtain firsthand ideas, actual examples, and real problems relating to the specific operations being conducted that will contribute significantly to the effectiveness of his instruction. Moreover, these visits will demonstrate his interest in the success of his students and will provide an exceptional opportunity to follow up his instruction by helping employees with individual problems.

How to Open Each Session

Teaching is more successful when the instructor demonstrates that he has thoroughly planned in advance for presentation of each session. Points to consider in presentation of a training course include the following:

1. Arrive at least 15 minutes before the class is scheduled to start.

2. Check program and supplies needed for the session.

   a. If outside speaker is to attend, review with him his part of the program, the length of his talk, and the material that he will present.

   b. Check film, slides, and projector if they are to be used.

   c. If pass-out sheets are to be handed out, make certain they are ready. Chalkboard presentation may be prepared. If charts are to be used, be sure they are arranged in the proper order.

   d. If name cards are to be used, these should be placed before each class member's station. Name cards are useful in introducing members to one another, make it easier to identify class members, and are helpful when directing questions to individuals in the group. Name cards may be easily made by folding a card or stiff paper into the form of a tent and writing the individual's name on each side, so the names are clearly visible to class members and to the instructor.

   e. If desired, packets or folders containing handout material, paper, and pencils can be placed at each member's place.

3. Check classroom.

a. See that tables and chairs are arranged properly. Suggested seating arrangements are illustrated in Figure 1.

b. Check lighting, heating, and ventilation.

4. Greet each person on arrival.

This is especially important at the first session. This gives an opportunity to register each member and provides a list against which future attendance can be checked. Attendance at future sessions can then be easily recorded by having each member of the class place a check by his name on the roster as he or she arrives.

5. Make introductions.

At the first meeting the instructor should first introduce himself, or he may be introduced by any representative of the establishment who is present at the first meeting. He may then ask each person present to identify himself by name and business connection. If a management representative known to the class members is present at the first meeting, he may be asked to open the meeting with appropriate brief remarks.

6. At the first session, clearly cover the following points:

a. Time and place of future meetings.

b. Length of course and material to be covered.

c. The diploma or certificate to be awarded at final meeting, if such is to be awarded.

d. Door attendance prizes, if such are to be awarded.

e. The type of tests, if tests are to be given, and what is expected of the class members.

7. At all sessions after the first, cover these points:

a. Give a brief summary of material covered to date.

b. Ask for reports on any assignments made at previous session.

c. State objectives of present session.

How to Close Each Session

Ordinarily, only a few minutes should be used to close the session. The following, however, should be covered:

1. Summarize material covered and points discussed.

2. Make a selling statement about the next session. The following are suggestions:

a. Stress the importance of the subject.

b. Ask individual class members to report on specific assignments. Let them know the instructor is depending on them.

c. Point out any special attraction, such as a film, a speaker, or a demonstration.

3. Ask for questions. Be available for questions at the close of the session.

4. Make group members feel the instructor is glad they came and will be looking forward to seeing them at the next session.

Adapting this Course to Various Groups and Teaching Situations

It is expected that this manual will be used by instructors with different backgrounds, to instruct various groups in which there will be some dissimilarity in the range of emphasis and objectives. For example, vocational teachers of "Food Sanitation and Service" in the Federally aided distributive education program, whose students are largely limited to customer-contact employees and supervisors, will emphasize personal grooming, good health habits, and customer relations, although they will not neglect sanitation, food preservation, and other important phases of this course.

Sanitarians, nurses, and dietitians who teach food service employees as a part of a local or State public health program would normally emphasize the importance of sanitation in the prevention of foodborne diseases. When this course is taught to food service personnel in the Armed Forces, either uniformed or civilian, there are many changes in emphasis, objectives, subject matter, and teaching methods from those used successfully in a class of civilian food service employees.

It is believed, however, that all of the principles and many of the details relating to trainee grouping, management of classes, and teaching methods discussed above are applicable to all classes of food service personnel. It is recognized that in special cases, the instructor must exercise judgment and imagination in applying these principles to his particular training situation and he is encouraged to do so.

In recognition of the necessity for adapting the objectives, content, and manner of conducting this course (which was prepared primarily for the training of food service employees in commerical establishments) to the realities of the teaching situation in the

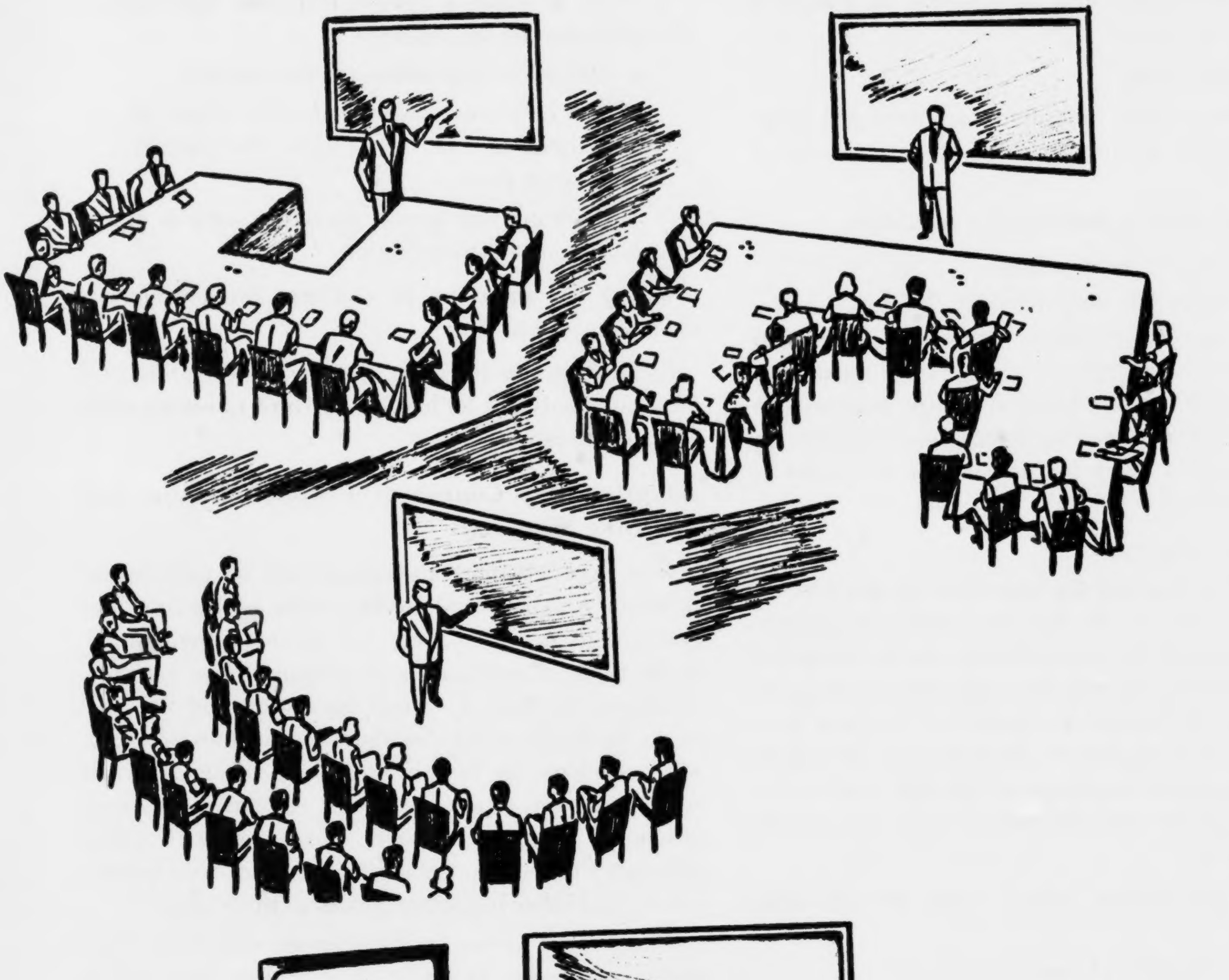


Figure 1. Some suggested seating arrangements for training classes.

Armed Forces, supplementary suggestions for the conduct of this course are presented.

Supplementary Suggestions for Armed Services Presentation

When this guide is used as a basis for planning and presenting food service training courses in the Armed Services (Army, Navy, Air Force, and Coast Guard), the principles, procedures, and criteria utilized by the Service concerned shall take precedence over the recommendations contained in this guide whenever a difference between the two exists.

It should be kept in mind that most food service personnel in the military will have had some formal instruction in health and personal hygiene and in food service techniques. Cooks, bakers, messmen, and stewards, in their respective schools, receive several hours training in the principles of food sanitation. It is important to keep this fact in mind so that the course may be geared to the proper level of knowledge to avoid boredom and disinterest. This is expecially true of annual refresher courses.

Military food service activities include a great variety of food service operations. These may be authorized mess installations, exchange restaurants (including civilian operated concessions), enlisted men's and officers' clubs, and military hospital kitchens. Thus, under military operation, both civilian and military backgrounds of trainees must be considered.

Some of the course material may have to be modified for military presentation. Emphasis should be placed on the factors involved in one specific job rather than an overall coverage of the field, because the military employ permanent specialized food service personnel who rarely deviate from a speciality field.

Military food service personnel should be well trained in situations requiring serving large numbers of persons in short periods of time. Emphasis should be placed on the problems involved in preparing and holding of large quantities of food, with special emphasis placed on preparing and serving food during field operations.

Supervisory personnel in charge of messes or other food service operations should be thoroughly trained in the principles of food protection since, in the final analysis, the sanitary quality of any food service operation depends upon the competency of such individuals.

Military food service personnel are proud of their past commissary achievements. Indeed, many food service specialists have attained excellent reputations based on experience and knowledge of sanitary food service. The instructor should take advantage of this experience by encouraging these persons to take an active part in the discussions.

There are many excellent military instructors for food service personnel training. Among those who have had special training in food sanitation are personnel of the medical services who have attended specialized training courses in environmental sanitation and related public health subjects.

PART III

The Guide

12/13

Lesson One

Importance and Magnitude of Food Service Industry and Need for Food Service Workers' Training

Page

Lesson Plan 16

Lesson Manuscript 17

  Principles to be Taught 17

  Introduction 17

  Scope and Nature of this Food Service Workers' Training Course 17

  Need for Food Service Workers' Training 18

  Purpose of Food Service Workers' Training 19

  Introduction of Microbiology 20

  Summary 22

Questions 22

Lesson Plan No. 1

Principles to be Taught

Introduction to the course

The magnitude of the food service industry and the importance of the food service worker

The significance and need for sanitary food handling practices

An introduction to microbiology

A. Introduction

B. Scope and Nature of this Food Service Workers' Training Course

1. Importance and size of food service industry.
2. Microbiology and foodborne diseases.
3. Methods for the prevention of foodborne diseases.
4. Personal hygiene, self-protection, and salesmanship.
5. Proper methods for washing and sanitizing dishes, utensils, and equipment.
6. Insect and rodent control.
7. Housekeeping and waste disposal practices.
8. Follow-up training and applying what has been learned.

C. Need for Food Service Worker's Training

1. Changing ways of life affect our eating habits.
2. Old and new problems in sanitary food preparation and service.
    a. Multiple handling.
    b. Changes in processing and preparation practices and procedures.
    c. Shipment between establishments and between jurisdictions.
3. Foodborne illness continues to be a major public health problem.
    a. Inadequacy in reporting of foodborne disease outbreaks.
    b. Food can be easily contaminated.
    c. Food readily supports growth of microorganisms.
    d. Food serves as a vehicle for transmission of bacterial toxins.
    e. Food may serve as a vehicle for transmission of toxic chemicals.

D. Purpose of Food Service Workers Training

1. The "human element."
2. Strive to insure wholesomeness of food.
3. Protect food from infection or contamination.
4. Meet consumer expectation.
    a. Consumer cannot inspect establishment himself.
    b. Consumer expects safe food.
    c. Aesthetic considerations.

E. Introduction to Microbiology

1. Premicrobiology days.
2. Invention of microscope.
    a. Discovery of microorganisms.
    b. Size of microorganisms.
3. Germ theory of disease.
4. Microbiology as a science.
5. Sanitary procedures are based on knowledge of microbiology.

F. Summary

Lesson Manuscript No. 1

Principles to be Taught

Introduction to the course

The magnitude of the food service industry and the importance of the food service worker

The significance and need for sanitary food handling practices

An introduction to microbiology

A. Introduction

In any food service operation, be it a commercial establishment or a noncommercial facility such as an institution or a military installation, the primary objective is to serve the consumer safe, attractive, appetizing, and nutritious food. At the same time, we must make sure that the health of that person is safeguarded by providing food that is wholesome and free from any substance or agent that will make him ill.

The responsibility for meeting these objectives belongs to all who work in the establishment—the owner, the manager, the chef, the cook, the hostess, the waiter or waitress, the busboy, the dishwasher, and the maintenance man. Whether these objectives are met depends upon the degree to which each person fulfills his individual responsibility.

Throughout this course we will be discussing many factors that will permit all who work in a food service establishment to more easily recognize and accept their responsibility as a part of their daily assignment.

B. Scope and Nature of this Food Service Workers' Training Course

1. *Importance and size of the food service industry.* There will be eight sessions in this entire course. Seven of these will be similar to this one, where we will be discussing such topics as the importance and size of the food service industry; the significance of sanitary food handling practices; and the need to be concerned about these practices. We will also present a brief introduction to microbiology.

2. *Microbiology and foodborne disease.* In our second session, we will go a little deeper into the field of microbiology, discussing bacteria and other microorganisms and their relation to man. We will learn about the types, characteristics, and sources of microorganisms. We will also discuss the methods by which disease is transmitted and how microorganisms may be destroyed or their growth retarded or prevented.

3. *Methods for the prevention of foodborne diseases.* Our third session will be a most important one. During it, we will discuss how microorganisms are spread in food establishments, the types of disease transmitted through food, and, of even more significance, practices, procedures, and techniques that we must follow to protect food in order to prevent foodborne illness.

4. *Personal hygiene, self-protection, and salesmanship.* Session four will relate to personal hygiene and self-protection. We will discuss the role of the individual food service worker in preventing the spread of foodborne disease. We will also discuss some techniques of salesmanship that will help you be a more successful employee and a part of the establishment team.

5. *Proper methods for washing and sanitizing dishes, utensils, and equipment.* Dishwashing is often looked upon as something apart from the rest of the operation of the establishment. During session five, we will see that dishwashing plays an important role in the successful operation of the business. We will discuss the role each worker has in the dishwashing operation and the proper methods for washing and sanitizing of utensils and equipment.

6. *Insect and rodent control.* The control of insects and rodents in and about the establishment will be the topic of our sixth discussion. Here, again, we will discuss the role of all workers in this important responsibility.

7. *Housekeeping and waste disposal practices.* We all like to work in clean and pleasant surroundings. The consumer, too, likes to visit the same kind of surroundings. In session seven, we will discuss two items: good housekeeping practices and waste disposal. We will see that we all have a responsibility for, and can

benefit from, good housekeeping practices.

8. *Follow-up training and applying what has been learned.* Session eight is the one in which we measure the success of this course. There will be no meeting, but we will visit you in your establishments to see how well you apply the principles of sanitary food handling throughout the course.

We will also work with your manager and you to overcome special problems you may continue to have.

C. Need for Food Service Workers' Training

The food and beverage service industry ranks fourth in size among all the industries of the Nation. The food and beverage establishments that make up this industry employ nearly three million persons. You are a part of that three million. Nearly 75,000 new employees are added to this number each year. You and your co-workers serve over 80 million meals daily in this Nation's varied types of food and beverage establishments. These numbers are on the increase.

1. Changing ways of life affect our eating habits.

Why has there been such an increase in the size of the industry in which you work? Changes in our way of living requires that more people eat away from home. Many factors are involved in providing an answer to this question.

You as food service workers have done a better job of selling.

Our ways of living have changed tremendously in recent years.

It is popular and convenient, as well as necessary, for most of us to eat away from home more frequently.

The expansion and consolidation of businesses and metropolitan centers, distance from job to home, increased employment of women, and the mobility of our population are all factors that have contributed to the growing patronage of food service establishments.

By advertising and promotional work, the food service industry has made the public more aware of attractive, nutritious, and tasteful food available in their establishments. Also, institutional feeding, through public schools, colleges, nursing homes, hospitals, and similar establishments has increased.

2. Old and new problems in sanitary food preparation and service.

Some time-honored food preparation techniques and practices are still used and are not likely to change, but as the food and beverage service industry has grown, of necessity, there have been significant changes in many food preparation and distribution techniques.

a. Multiple handling.

Where once most of the food served in our establishments was grown locally and prepared within the establishment, today many people and processes may be involved in the production and preparation of the food served. In addition to food that is produced in this country being readily available to us, food from the four corners of the world is also available in our food establishments. For example, beef and mutton may come from South America and Australia, seafoods from Japan, fruits such as copra (coconut), dates, figs, and olives from Africa and the Middle East, spices from the Orient, salmon and other fish products from Alaska, meat and cheese products from many European countries. Actually we can say that the world has become one great community kitchen, producing and distributing food to all parts of the world. All these foods, whether they are produced in this or a foreign country, may be handled many times, and each time they may become contaminated with something that may make a person ill.

b. Changes in processing and preparation practices and procedures.

Today, instead of doing the major part of preparing the food we serve ourselves, much of it has been partially or completely prepared for service by others. It may be in portion size, it may be frozen, partially cooked, or in any one of the many stages of preparation for serving. It may have been packaged in a special manner.

During each stage or procedure in the food processing chain, a momentary breakdown in equipment or the lack of application of sanitary food handling practices can contaminate the product or create a condition that may lead to an outbreak of foodborne illness.

c. Shipment between establishments and between jurisdictions.

Since many foods are partially prepared at distant points or prepared in a centrally located kitchen for service elsewhere, they are subject to a variety of conditions during transportation, any of which may create a situation that could result in an outbreak of foodborne illness. Even though rigid controls are maintained during preparation or processing, such controls can be rendered ineffective if they are not continued during the actual transportation and storage of the food.

3. Foodborne illness continues to be a major public health problem.

Although the far greatest part of food served today is wholesome and safe for consumption, there is ample evidence to indicate that foodborne illness is not being adequately controlled.

About 200 disease outbreaks affecting nearly 10,000 individuals are reported annually. Of these outbreaks, about 3% are waterborne, 4% are caused by milk or milk products, and the rest, or 93%, are associated with other foods, especially poultry, fish, and meat products.

In addition, it is estimated that there may be more than two million cases of unreported foodborne illness which occur in this country annually.

a. Inadequacy in reporting of foodborne disease outbreaks.

Why do we say estimated cases?

We have to estimate the total number of cases because outbreaks of foodborne illness are not universally reported. We do know, however, that most of the cases reported are associated with large outbreaks that occur in institutions, at banquets, parties, or picnics where a common meal is eaten by a group of individuals. These are reported because a number of people become ill at approximately the same time with the same symptoms; such unusual occurrences are brought to the attention of health officials, and the outbreak is investigated.

But this is not usually the situation with outbreaks that occur from eating in restaurants, cafeterias, or other types of establishments. Outbreaks of foodborne illness can and do occur in these types of establishments much more frequently than is reported. These are not reported because individuals who become ill usually are not known to one another, may be from many different areas of the community or country, and may believe they are the only ones affected, when in fact there may be a large number involved.

b. Food can be easily contaminated.

Unfortunately, food can easily become contaminated during any of the stages of production or processing it goes through from the time it is grown until it is eaten by the customer. If we think of all the processes involved in the production and preparation of the food and the many ways in which it may become contaminated with foodborne disease organisms, we can be thankful that there are not more outbreaks of foodborne illness. It's sprayed with chemicals, fertilized, cut, harvested, mixed, processed, canned, bagged, packaged, frozen, stored, transported, thawed, ground, sliced, browned, broiled, cooked, roasted, fried, toasted, baked, served, and eaten.

c. Food readily supports growth of microorganisms.

Just as food is one of the essential elements for the growth of man, so is it one of the essentials for the growth of all microorganisms, including those that cause illness. Thus, if we cannot prevent all bacterial contamination of food, the growth of disease-producing bacteria must be prevented or controlled in some way to prevent outbreaks of foodborne illness.

d. Food serves as a vehicle for transmission of bacterial toxins.

Foodborne illness is not only caused by bacteria themselves. Individuals can also be made ill by the waste products produced by bacteria as the bacteria grow and multiply. Just as the disease-producing bacteria can be transmitted through food, their waste products—called toxins—can also be transmitted in the same way and cause a person to become ill. And here again, if we are to prevent the formation of toxic substances by bacteria in the foods we serve, we must prevent the growth of the bacteria which may contaminate that food and produce the toxin.

e. Food may serve as a vehicle for transmission of toxic chemicals.

Many chemicals are used in the production of our food supply. Fertilizers are used to increase yield, and pesticides are used to control insects and other pests. In our own operation, it is sometimes necessary to use chemical for the control of pests such as flies, rodents, and cockroaches, and for cleaning and sanitizing.

D. Purpose of Food Service Workers' Training

Most of you have probably worked in food service establishments for some time, others of you may be relatively new to food service work, and many of you may be wondering why you are included in a food service worker training course such as this.

Unfortunately, as we have pointed out, food can be easily contaminated and has the potential to support bacterial growth. For this reason, it is essential that hygienic principles of food handling be applied at all points along the food chain. This not only prevents food from being contaminated by disease-producing organisms, but also by spoilage organisms.

1. The "human element."

We know that the "human element," "the individual," is the single most important factor in the control of foodborne illness. Work habits that food service workers have learned and practiced for many years are not easily changed. But we believe that food service workers, by knowing more clearly the principles of sanitary food preparation and service and why they should be practiced, will want to apply these principles more conscientiously during their work.

Let us list three broad goals that a food service worker must strive to achieve in his responsibility to himself, his fellow employees, and most importantly, the customer if he is to do his job successfully.

2. Strive to insure the wholesomeness of food.

A food service owner or manager must make sure that the food he serves his customers is from animals that are free from disease, and from vegetables that are free from pesticides or other unwholesome ingredients. Also, he should know that the food has been prepared and processed under sanitary conditions.

He must also make sure that the food has not been prepared or treated with a substance that will render it an adulterated product. Some processors may take an old or unfit food product and treat it with a chemical to make it look like fresh food. Therefore, the source of the food must be known, and such source should be under inspection by a regulatory agency.

3. Protect food from infection or contamination.

The food service worker must at all times strive to apply the principles of sanitary food handling. These principles are designed to reduce to a minimum the opportunity for microorganisms to gain entrance and grow in food. Special consideration must be given to those disease-producing organisms that may be transmitted through food. At the same time, we can be limiting the number of organisms which cause food spoilage and thereby prolong the keeping quality of our food.

4. Meet consumer expectations.

The worker must strive to see that the food, the service, and the establishment in which they work meet their own as well as the customer's expectations.

a. Consumer expects safe food.

The customer expects to be served a food which is wholesome and free from any contamination that may make him ill.

b. Consumer cannot inspect establishment himself.

A customer places his health in your hands each time he has a meal or a snack with you. Because he cannot inspect the kitchen each time he eats, he depends upon you to fulfill your responsibility in providing a clean, wholesome, and safe food for him.

Customers expect to be served a wholesome, appetizing food that has been prepared and handled in a sanitary manner and in a clean environment. The fact that food prepared in an insanitary kitchen or environment might appear to be clean, or that an unclean food might not make a person ill, does not mean it is acceptable to the customer.

c. Aesthetic considerations.

Aesthetic considerations play an important role in a food sanitation program. The customer judges an establishment largely on the basis of observation. He may know little about conditions in the kitchens or workrooms but he is conscious of the environment where he is served.

An excellent kitchen with superior food-handling techniques is unlikely to be appreciated if the serving area is shabby or carelessly maintained. The public is frequently more aware and more critical of poor service or aesthetically undesirable conditions than those that may actually be of direct or immediate public health concern, since the latter conditions are usually not observed by the customer.

E. Introduction to Microbiology

We have pointed out that one of the primary objectives of a food service establishment is to serve the customer attractive, appetizing, and nutritious food. More important, the food must be safeguarded in such a manner so it will not become contaminated with a substance or agent that will make the customer ill, and at the same time so that the growth of the organisms will be limited should the food become contaminated.

To meet these objectives and to fulfill your work responsibilities, you must know the basic principles of the sanitation program designed to prevent foodborne illness. You must also know that these basic principles must be applied at all times, not just when it is convenient and easy to do so.

For example, in making sandwiches, we should use tongs, a fork, or other utensils to handle slices of meat, thus eliminating handling the food with our hands. Using utensils in this manner is a good sanitation practice; during rush periods, however, workers frequently revert to handling the sandwich ingredients with their hands and, thereby, increase the chances of contaminating the food. Although many foods must be handhandled during preparation, we can, with practice, learn to handle more foods with utensils and will find it can be done just as conveniently and quickly as with the hands alone. If we must use our hands, make sure they are clean and consider the use of single-service plastic gloves.

In order for us to more fully understand why food protection principles must be applied, we must have a basic knowledge of microbiology, specifically of those organisms that may affect the health of the consumer or the quality of food or food products.

1. Premicrobiology days.

All of us know that some bacteria cause disease. This fact was not known prior to the middle 1800's. Primitive people thought disease and sickness were caused by evil spirits, whose special reason for being was to make life miserable for man. They believed devils or evil spirits would hide in sticks and stones, animals, trees, rivers, earth, and sky, then jump out to invade and torture the human body. These people believed that they could appease the gods or evil spirits by offering sacrifices or performing feats of magic. Often tribes would perform dances, rattle sticks, beat drums, wear weird masks, paint the face and body, or wear bright-colored clothes to ward off the evil spirit believed to cause disease. Even now there are primitive people who believe disease is caused in this manner and who go through similar performances in attempts to ward off or cure disease.

Today we know that there are many different causes for sickness and death and that many diseases are caused by very tiny living cells. They are called microorganisms because they can be seen only through a microscope. We will use the term microorganisms frequently in our discussions in this course to describe the tiny living cells.

2. Invention of microscope.

Our understanding of microorganisms and microbiology goes back to the 17th century to a Dutch linen merchant, Anton Van Leeuwenhoek. Leeuwenhoek as a hobby was making small hand lenses that magnified or made objects appear larger than their real or actual size. He was not satisfied with the lenses he had or those that were available to him; therefore, he made better and better hand lenses so he could see smaller and smaller objects.

a. Discovery of microorganisms.

He took insects apart and studied their internal structure through the lenses. He studied sperm cells and was amazed at the similarities in these cells. He examined beer, wine, and vinegar and found what we know today to be yeast cells. He looked at water from ponds and the sea. He took scrapings from his teeth, and discharge from his bowels and from the bowels of animals. In all of these, he was astonished to find minute living creatures. He saw that many of these creatures had similar characteristics but that they were also very different. He did not give them names but called them "wee beasties." Today we know many of Leeuwenhoek's "wee beasties" to be bacteria.

Although neither Leeuwenhoek nor other scientists of his day realized or understood the significance of this discovery, there is one fact of which Leeuwenhoek took special note: wherever he looked, he found his "wee beasties." If we look through a microscope, we would also find Leeuwenhoek's "wee beasties," or bacteria, in just about any place we care to look.

b. Size of microorganisms.

To see bacteria, we must look at them through a microscope. It is hard to visualize something that cannot be seen, but remember that it takes about 25,000 individual bacteria placed end to end to make an inch, or a microorganism is about 1/25,000 of an inch in length.

3. Germ theory of disease.

Although Leeuwenhoek discovered bacteria, the true relationship of bacteria to disease was not understood until about 1865 when Louis Pasteur advanced what is known as the "Germ Theory of Disease." This theory says that for every disease there is a specific type of organism that causes the disease and that these organisms must invade the body in some manner to make a person ill.

4. Microbiology as a science.

Microbiology, or the study of microorganisms is a relatively new science, hardly more than 100 years old. The greatest advancements in the study of microscopic life have been within the past 50 years.

Even with the knowledge that disease is caused by microorganisms, it is sometimes difficult to understand fully how a person can become sick by eating a food that looks appetizing and tastes delicious.

5. Sanitary procedures are based on knowledge of microbiology.

By knowing how microorganisms live, how they grow and reproduce, and how they are transported from place to place, we can better understand how they an make a person ill. We can at the same time learn how best to control their growth in order to prevent a person from becoming ill or how best to make use of their growth process for the benefit of man.

F. Summary

In this first lesson we have learned that we work in a large industry. Actually, it is the fourth largest of all industries in the nation. We have learned that we, as food service workers, are an important part of that industry. Without the food service employee, the millions of customers who eat in the many types of establishments each day would not be fed.

We have learned that although our food supply is the safest on this earth, foodborne illness continues at the rate of more than 10,000 reported cases each year, but the number of cases actually occurring is probably closer to two million cases each year.

We have learned that these cases of foodborne illness can be prevented by the application of the basic principles of food protection—principles we will be discussing throughout this course.

We have also looked briefly at the history and importance of microbiology in the application of these principles to the prevention of foodborne illness. We will discuss these in our future meetings and learn a great deal more about the principles of food protection.

Questions for Use With Lesson 1

IMPORTANCE AND MAGNITUDE OF FOOD SERVICE INDUSTRY AND NEED FOR SERVICE WORKERS' TRAINING

True	***False***		
☐	☐	1.	The methods we use in preparing our food have changed very little in recent years.
☐	☐	2.	In preparing and serving food, there may be a great many individuals involved.
☐	☐	3.	The food served to the customer in food service establishments is usually grown locally.
☐	☐	4.	Foodborne illness is no longer considered a public health problem.
☐	☐	5.	Most of the outbreaks of foodborne illness occur as a result of eating or drinking food other than milk.
☐	☐	6.	The total number of outbreaks of foodborne illness is accurately known.
☐	☐	7.	Outbreaks of foodborne illness are more likely to be reported when they occur in an establishment such as a school, industrial cafeteria, or similar type of food service operation.
☐	☐	8.	The single most important factor in the control of foodborne illness is the habits of the individual food service worker.
☐	☐	9.	A food service employee must strive to insure that only wholesome food is served in the establishment where he works.
☐	☐	10.	A customer's opinion of the establishment in which he eats is most frequently based upon the sanitary conditions in the kitchen.
☐	☐	11.	It is important for food service employees to understand microbiology if they are to understand why sanitary food handling practices are required.
☐	☐	12.	In the early 1700's, bacteria were known to cause disease.
☐	☐	13.	The food service industry is one of the five largest industries.
☐	☐	14.	It is a relatively simple matter of explain why a person becomes ill after eating.
☐	☐	15.	You can always tell which food has been involved in an outbreak of foodborne illness because it has a peculiar taste that identifies the substance causing the illness.

Lesson Two

Microbiology and Foodborne Disease

Page
Lesson Plan 24
Lesson Manuscript 25
    Principles to be Taught 25
    Introduction 25
    Classification and Types of Microorganisms 25
    Sources of Foodborne Disease Microorganisms 27
    Classification of Foodborne Diseases 28
    Summary 32
Questions 33

Lesson Plan No. 2

Principles to be Taught

Classification of microorganisms

Growth characteristics and factors affecting microbial growth

Classification of foodborne diseases

A. Introduction

B. Classification and Types of Microorganisms

1. Classification of microorganisms.
   a. Bacteria.
      (1) Classification of bacteria according to shape.
         (a) Round or spherical shape (cocci).
         (b) Rod or elongated shape (bacilli).
         (c) Spiral or comma shape (spirilla).
      (2) Factors influencing growth of bacteria.
         (a) Nutrients.
         (b) Moisture.
         (c) Temperature.
         (d) Time.
2. Types of microorganisms.
   a. Useful microorganisms.
   b. Harmless microorganisms.
   c. Harmful or disease-producing microorganisms.

C. Sources of Foodborne Disease Microorganisms

1. Man.
2. Animals.
3. Insects and rodents.

D. Classification of Foodborne Diseases

1. Types of foodborne illness.
   a. Foodborne intoxication.
      (1) Food intoxication due to staphylococcal enterotoxin.
      (2) Food intoxication due to exotoxin of *Clostridium botulinum.*
   b. Foodborne infections.
      (1) Bacterial infections.
         (a) Salmonellosis.
         (b) *Clostridium perfringens* infections.
         (c) Bacillary dysentery (Shigellosis).
         (d) Other bacterial infections.
            : Brucellosis.
            : Hemolytic and other streptococcal infections.
            : Tuberculosis.
      (2) Parasitic infections (nonbacterial).
         (a) Amoebic dysentery (amoebiasis).
         (b) Trichinosis.
         (c) Tapeworms.
      (3) Viral infections.
         (a) Infectious hepatitis.
         (b) Poliomyelitis.
         (c) Coxsackie and ECHO viral infections.
   c. Chemical poisoning (intoxication).
   d. Poisonous plants and animals.

E. Summary

Lesson Manuscript No. 2

Principles to be Taught

Classification of Microorganisms

Growth characteristics and factors affecting microbial growth

Classification of foodborne diseases

A. Introduction

In our first lesson, we learned that the food service industry is the fourth largest among all industries in this country. We can see, therefore, that the food service worker is a vital link between the producer and the consumer; without the cook, waitress, dishwasher, and other people who work in food service operations, the millions of persons who eat away from home each day could not be fed. We have also learned that not only do consumers depend upon these workers for the nutritious and palatable quality of their food, but also for the safety of that food as well.

Sanitary laws and regulations that govern the operation of food service establishments are based upon our knowledge of microorganisms. These laws and regulations are designed to promote and protect health by applying knowledge to control the growth of disease-producing organisms. Fundamental to food service sanitation or food protection is the understanding that those food and environmental conditions necessary to sustain man are also ideal, in most instances, for the growth of many types of microorganisms. The lack of appreciation of these facts and apathy toward consistent good sanitary food handling practices will inevitably lead to outbreaks of foodborne illness.

In this lesson, we will be learning more about the field of microbiology. We will be discussing briefly the different types and growth characteristics of bacteria and other microorganisms. We will place particular emphasis upon those diseases of primary concern to food service workers. Thus, it will become more obvious to you how the sanitary laws and regulations that govern the operation of food service establishments have evolved from our evergrowing knowledge of microbiology. It will also become obvious why the principles of food protection must be consistently applied at all times.

B. Classification and Types of Microorganisms

Many thousands of microorganisms have been discovered since Leeuwenhoek first saw his "wee beasties" through his simple hand lenses more than 100 years ago. Improvements in the construction of microscopes as well as improved laboratory techniques have been instrumental in furthering our search for a clearer understanding of microbiological life.

Although we cannot see the world of microorganisms without the aid of a microscope, we should not permit this to be confusing. Microorganisms are similar to people in many ways, and just like people, they can be placed in different categories or classifications, to make our understanding of them much easier and clearer.

1. Classification of microorganisms.

Microorganisms are small unicellular or multicellular living entities that require the use of the microscope for direct observation. Just like people, they take in food, reproduce, and give off waste products. Many microorganisms may be found in food, for it provides an ideal place in which they can live and grow. Some of these may cause illness in the person who ingests the food item that the organism contaminates. Outbreaks of acute illness caused by eating food in which certain microorganisms have multiplied profusely are referred to as foodborne disease outbreaks. Microorganisms that may cause foodborne illess include bacteria, viruses, and parasites.

Although different types of microorganisms cause foodborne illness, most outbreaks are caused by bacteria. For this reason, most of our discussion of the classification of microorganisms will be limited to bacteria and only touch very briefly on viruses and parasites.

a. Bacteria.

Bacteria are single-celled plants that contain no chlorophyll, the coloring material that gives other plants their green color. They are very small but do have some variation in size. Generally, we can say that they are 1/25,000 of an inch in size. In other words, it would take as many as 25,000 individual bacteria placed side by side to equal 1 inch.

(1) Classification of bacteria according to shape.

Although there are many types of bacteria they can be classified into three major categories according to shape or form.

(a) Round or spherical shape (cocci).

The first of the three forms is round in shape. Bacteria having this shape are called cocci. As we look through a microscope at some of these round types of bacteria, we see them growing or being arranged in different patterns. For example, some of them may occur as single cells, others may be arranged in chains, and still others may grow in clusters much like a bunch of grapes.

(b) Rod or elongated shape (bacilli).

The second shape used in the classification of bacteria is the rod or elongated form. These types of bacteria are called bacilli. Like the round bacteria, the rod shaped ones may be found singly, in pairs, or in chains much like links of sausage.

Two groups or genera of the rod shaped bacteria have a characteristic of great importance in our application of food protection practices: these genera produce spores. A spore is a stage in the life cycle of the organisms that is much more resistant to heat, cold, or antibacterial agents than the usual bacterial cell. The spore is produced within the vegetative cell by the development of a thick and relatively impervious cell wall that makes it much more difficult to destroy.

(c) Spiral or comma shape (spirilla).

The third shape used to classify bacteria is the spiral or comma shape. These bacteria are called spirilla or vibrio and are found only as single cells and not in any special arrangement. None of the spirilla are known to cause foodborne disease in man, but at least one of the vibrio is so related.

(2) Factors influencing growth of bacteria.

Bacteria, being single-celled organisms have a relatively simple growth process. Reproduction of the bacterial cell takes place simply by a cell dividing into two new cells. Each new cell then divides into two additional cells. This reproduction is rather rapid under favorable environmental conditions and can occur on the average each fifteen to twenty minutes.

There are a number of factors that influence this growth. Important among these factors are the nutrients or food available for use by the bacteria, the moisture of the medium in which the bacteria may be found, and the temperature of the medium and time the bacteria live in the medium. We frequently utilize this knowledge in preserving food as well as in applying principles of food protection. Even the amount of acid or pH present can be a determinant as to how well organisms grow.

(a) Nutrients.

The bacterial cell contains a cell wall through which the cell takes up simple nutrients in solution that the cell combines for utilization in its growth process. The nutrient requirements for bacterial growth vary with the individual kinds of bacteria. Although some have very specific food requirements, others may utilize a wide variety of nutrients. Bacteria responsible for foodborne illness thrive in many of the foods man eats in his daily diet, especially those high in protein such as milk, eggs, poultry, and meat.

(b) Moisture.

The amount of moisture necessary to support bacterial growth varies; generally, however, bacteria need food high in moisture to grow. This condition can be found in most of the foods we eat, and these foods, therefore, provide an ideal environment in which bacteria may grow.

(c) Temperature.

Bacteria grow over a wide range of temperatures; however, all bacteria have a temperature at which they grow best. Some may grow at or near freezing and some will grow at temperatures above 160°F. In general, we can say that all bacteria that cause outbreaks of foodborne illness can grow somewhere within the temperature range of 45° to 140°F and may survive temperatures as high as 140°F. Most of these, however, grow well at temperatures between 60° and 120°F, and they have optimum or ideal growth temperatures at or near 98°F. Therefore, disease producing bacteria have relatively ideal conditions under which to live when they are in food held at room temperature.

As you will see throughout our discussion, temperature plays an important role in the control of bacterial growth because temperature is the one factor affecting bacterial growth that we can conveniently control, no matter what kind or condition of the food.

(d) Time.

Bacteria do not grow or produce toxins instantaneously. As we mentioned previously, splitting of the bacteria cells takes place about every 15 to 20 minutes. In other words, if we start with one cell, in 15 minutes it would be possible to have two; in 30 minutes, four; in 45 minutes, eight; and in 1 hour, 16. We usually start, however, with thousands of bacteria, so with proper conditions you can see that soon an astronomical number could be present. This is the reason we emphasize controlling the time factor. Do not permit potentially hazardous foods to stand at room temperature for extended periods of time. Refrigerate or heat the foods as rapidly as possible to keep them out of the danger zone of 45° to 140°F.

2. Types of microorganisms.

Many different types of microorganisms may be found in food. Some of these may occur naturally; some may be introduced during the processing of food, such as the introduction of salmonella into poultry products during slaughter; and some may be introduced during preparation of the food in a food service establishment. We shall discuss later where these organisms come from.

Fortunately, most microorganisms cause no harm to anyone; others are helpful and serve a necessary and useful purpose. Some microorganisms are harmful and can cause illness. An organism capable of causing a disease is said to be pathogenic. You will want to remember this word, pathogenic, for we will use it frequently in our discussion.

a. Useful microorganisms.

Many microorganisms are of the type that perform some useful function for man. Without this type we would not have many of the tasty foods we so frequently enjoy. These microorganisms are necessary for making cheese, wine, beer, sauerkraut, vinegar, and many other food products. They are essential to the decay of dead matter by assisting in breaking down dead organic material and returning it to the soil. Without them all the dead trees, leaves, animals, and other matter would accumulate where they fall. It would not rot, but remain in its present form. All of us can imagine what the world would be like if this were to happen.

b. Harmless microorganisms.

By far the greatest number of microorganisms fall into that group that is harmless to man. Although many are not really useful, they do no harm when they contaminate food, except to cause spoilage if the food is mishandled. We use some types of harmless bacteria as indices of the sanitary conditions of a food or food contact surface. The coliform group of bacteria is one such type. Coliform organisms are natural inhabitants of the intestinal tract of warm blooded animals, including man. When we find them in our food, milk, water, or on food equipment or utensils, we know that there is an excellent chance that these items may be contaminated with pathogenic organisms as well.

c. Harmful or disease-producing microorganisms.

Harmful microorganisms are those that may cause a disease if they, or some of their growth products, gain entrance into the human body. As we have said, all microorganisms that cause illness in man are said to be pathogenic microorganisms. Many organisms can cause illness; however, we are specifically concerned with those that can cause illness when taken into the body with the food we eat. For example, typhoid fever, dysentery, botulism, and salmonellosis are diseases that may be transmitted by the consumption of a food product. It should be remembered, however, that less than 1% of all bacteria is harmful to man.

C. Sources of Foodborne Disease Microorganisms

Leeuwenhoek found microorganisms wherever he looked, and today we can do the same. They are universally distributed: on our hands, our bodies and clothes; in the air and the soil; on utensils and equipment; and in sewage and contaminated water. The animals we use for food are equally contaminated, and man and animals are the primary sources of the pathogenic microorganisms that contaminate the food we eat and cause outbreaks of foodborne illness.

1. Man.

Man himself is by far the greatest source of microorganisms that cause outbreaks of foodborne illness. Microorganisms from the discharge of the human intestinal tract, and the respiratory tract, and from infected sores, cuts, and boils, can and do frequently contaminate food.

It is not necessary for a person to show signs of illness to harbor disease organisms. People who in all respects appear to be in good health may carry disease-producing organisms in their body and may in the process of preparing or serving food transfer some of those organisms to the food. Such people are known as carriers.

2. Animals.

Animals man uses for food, such as cattle, swine, and poultry, have disease organisms or parasites in their bodies. These organisms or parasites may in turn be transmitted to man when he consumes the food products prepared from those animals. Examples of diseases caused by these organisms are trichinosis, which is associated with eating raw or undercooked pork or pork products from infected animals; salmonellosis, associated with a number of animals but especially with poultry and poultry products; undulant fever (brucellosis), associated with drinking raw milk from infected cattle or with direct contact of man with the infected cattle, swine, or sheep.

3. Insects and rodents.

Insects such as flies and cockroaches, because of the places in which they breed and live and because of their habits, may be important factors in the transmission of diseases. The causative organism of diseases such as salmonellosis and dysentery are known to be spread by these insects.

Rodents, especially rats, are a major factor in the transmission of a number of disease organisms. Rats have been incriminated in the transmission of such diseases as salmonellosis, bubonic plague, leptospirosis, and endemic typhus, as well as a number of foodborne diseases.

In a later lesson we will discuss in some detail the factors associated with insect and rodent control.

D. Classification of Foodborne Diseases

The United States Public Health Service lists 62 diseases that are communicable or that may be transmitted from man to man or from animals to man. Of these, 25, or 40%, may be transmitted through foods. As research advances our knowledge in food technology and in the epidemiology of foodborne disease, we are finding that foods are becoming involved more and more in disease transmission.

Food poisoning, or to be more exact foodborne illness, applies to certain illnesses of abrupt onset following the ingestion of food containing pathogenic microorganisms, bacterial toxins, or toxic chemical compounds. Sometimes we do encounter a poisonous food, such as poisonous mushrooms, but generally the illness is caused by microorganisms or their growth products, or from toxic chemicals that contaminate food. For convenience and because the different illnesses often exhibit characteristic symptoms, we can classify these illnesses into different types.

1. Types of foodborne illness.

There are four major types of foodborne illness. These are known as foodborne infections, foodborne intoxication, chemical poisoning, and poisonous plants and animals. Let us take a look at each of these four types and learn something about each one, so that we may have a better appreciation of the role that food service workers play in the prevention of these diseases.

a. Foodborne intoxication.

Foodborne intoxication occurs when certain microorganisms that contaminate food have had the opportunity to grow and produce chemical substances that are poisonous (toxic) to the person eating the food. You will notice we have said that the microorganisms must have had the opportunity to grow. We have mentioned that organisms need certain conditions—such as a food supply, moisture, sufficient time, and the right temperature—if they are to grow. We usually have, in the food itself, two of these essential conditions: the moisture and the food supply. If food does become contaminated in some way, we can control the growth of the microorganisms only by controlling the third and fourth factors: temperature and time. Therefore, if these toxins are present in the food, we can be sure the food has been held at temperatures for a sufficient length of time to permit growth of the microorganisms and the production of the toxin. Unfortunately, the toxin does not usually change the looks or flavor of the food, and persons consuming the food are not aware that they are eating something that may make them extremely ill.

Some of these toxins are most difficult to destroy or to render inactive, whereas others can be easily destroyed. The toxins produced by certain strains of staphylococcal organisms will withstand boiling temperatures for long periods of time and are virtually impossible to destroy by normal cooking methods, but the toxin produced by the botulism organism may be destroyed in a few minutes by boiling.

(1) Food intoxication due to staphylococcal enterotoxin.

Outbreaks of foodborne illness are very frequently caused by the toxin of staphylococcal organisms. Most people are carriers of staphylococci, which are natural inhabitants of our bodies and are found most frequently in the nose and on the skin. Usually, we are completely unaware of their presence. Frequently, outbreaks of staphylococcal foodborne intoxications are traced to food service workers with nasal discharge, skin infections, or infected cuts or boils. Foods commonly involved are cooked ham and other meats, and cream-filled or custard-filled pastries. Salad-type foods such as potato salad, ham salad, tuna salad, or those having a high protein content are frequently associated with outbreaks of foodborne illness caused by toxins of staphylococcal organisms.

The toxins produced by the staphylococcal organisms are difficult to inactivate by heat, and normal cooking times or temperatures effect them very little. Therefore, it is extremely important that we do not hold food under conditions that will permit growth of these organisms. We will discuss at some length later in this course how we can control the growth of all organisms that cause foodborne illness.

Persons made ill from eating food containing the staphylococcal toxins will usually become ill 1 to 6 hours after eating and will experience nausea, vomiting, diarrhea, and abdominal cramps. Frequently, they will be so ill that they will be confined to bed or even hospitalized. Although people usually recover from this illness, death does sometimes occur. Persons in poor physical condition, the young, and the older age groups are at greatest risk.

(2) Food intoxication due to exotoxin of *Clostridium botulinum*.

All of you no doubt have heard of the botulism poisoning problem a few years ago caused by improperly processed, packaged, or transported fish. Unfortunately, a number of human deaths were associated with these outbreaks.

Botulism, too, is caused by a toxin produced by a certain organism, and it is usually associated with underprocessed food that has a normally low-acid content. Home-canned green beans, corn, and similar products are foods of the low-acid type that have been involved in cases of botulism. Today other types of foods, even pickles, have been found to contain the organisms that produce the deadly botulinal toxin. This toxin is extremely poisonous, but is easily destroyed by heat. For this reason, home-canned low-acid foods, such as those we have just mentioned, should not be tasted before heating to the boiling point. In a number of deaths from botulism, the person who had no more than tasted a small portion of the contaminated food, died as a result.

Persons suffering from botulinal intoxication usually become ill within 12 to 36 hours and experience dizziness, double vision, and muscular weakness, as well as difficulty in swallowing, speaking, and breathing.

Although there have been great advances in recent years in the treatment of botulism, it is frequently a fatal disease.

b. Foodborne infections.

Foodborne infections, in contrast with foodborne intoxications, occur when specific organisms contaminate food and have the opportunity to grow and multiply to large numbers before the food is eaten. Unlike the illness caused by the presence of a toxin, it is the organism itself that causes the illness.

There are three general types of foodborne infections: those caused by bacteria, those caused by parasites, and those caused by viruses.

(1) Bacterial infections.

A number of specific organisms cause infection through food. They all are important from the standpoint of prevention; however, we will discuss only those that are most frequently involved in outbreaks of foodborne illness.

(a) Salmonellosis.

Our most frequent type of foodborne infection is that caused by organisms of the genus *Salmonella*. There are more than 1,200 different varieties of salmonella, and most of them may cause illness in man. Foods most frequently involved in outbreaks of salmonellosis are eggs and poultry products, although meat and meat products are also frequently involved. These foods may become contaminated during slaughter and preparation of the animal or at any of the many points where the food is handled or processed, from the time of slaughter or harvesting until it is served to the consumer.

The time before symptoms of foodborne infections appear is usually longer than for foodborne intoxications. Salmonellosis may occur in 12 to 24 hours, but in the case of typhoid fever it may not appear for as long as 3 weeks. There are a wide variety of symptoms. The more common ones are fever, abdominal pain, diarrhea, frequent vomiting, and chills. Although salmonellosis is not often fatal, it is a special hazard to those who are in poor physical condition, or to the very young and the aged.

(b) *Clostridium perfringens* infections.

An organism being more and more frequently associated with outbreaks of foodborne illness is *Clostridium perfringens.* It belongs to the same genus as the botulinum organism. However, disease produced by the perfringens is not as severe as botulism, and very few deaths have occurred. The *Clostridium perfringens* organism is a normal inhabitant of the intestinal tract of man, as well as a constant contaminant of soils, nonpotable water, and unprocessed foods. There are also heat-resistant strains of these organisms, which are extremely difficult to kill by heating or cooking. This makes it extremely important that we take precautions with foods that are to be reheated, so that any of these organisms that may be in the food are not permitted to grow.

Almost all the outbreaks from this type of an infection have been associated with cold, cooked, or reheated meat, stews, or meat pies. Stews and similar type dishes are frequently prepared from leftover food, and because leftovers often remain unrefrigerated for extended lengths of time, such foods have often been incriminated in outbreaks of foodborne illness.

Persons suffering from a *Clostridium perfringens* infection will usually become ill within 8 to 22 hours after eating. They will suffer acute abdominal pain and diarrhea. Unlike salmonellosis, *Clostridium perfringens* infection will not usually cause nausea and vomiting. Also, fever, shivering, and headaches will be rare.

(c) Bacillary dysentery (Shigellosis).

Although not occurring as frequently as infections from salmonellosis, bacillary dysentery is not an uncommon type of foodborne disease. It is caused by an organism of the genus *Shigella.* When found in moist prepared foods such as ham and egg salad and milk or dairy products, usually the food has been contaminated with feces of an infected person. Outbreaks of bacillary dysentery in a food service establishment frequently indicate a breakdown in the basic principle of personal hygiene and food protection.

Symptoms of diarrhea and cramps, accompanied by fever and often vomiting, usually develop in 2 to 3 days after consuming the food containing the organism. In severe cases, the stools of the patients may contain blood.

(d) Other bacterial infections.

There are a number of other infections that can and are occasionally transmitted through food. We will consider them only briefly here, but their importance as foodborne diseases cannot be overlooked.

Brucellosis.

With the advent of milk pasteurization and dairy herd management practices, brucellosis or undulant fever (Bang's Disease) has been virtually eradicated. It is still a problem if raw milk is used; this is one of the more important reasons why only pasteurized Grade "A" milk should be served to the consumer.

Hemolytic and other streptococcal infections.

Streptococcal foodborne infections occur from food contaminated with fecal material or nasal or oral discharges from cases or carriers, or from milk from cows having udder infections. In contrast to the intoxication type of illness, the symptoms of streptococcal infection do not occur as quickly.

Tuberculosis.

Tuberculosis continues to be a major public health problem in this country, but fortunately it is not frequently foodborne. It can occur, however, from drinking raw milk or from eating other contaminated dairy products such as cheese made from the milk of infected cattle.

The only way to effectively control foodborne tuberculosis is to eradicate it from cattle, use only pasteurized milk and other pasteurized dairy products, and prohibit suspected or confirmed human cases from working in food establishments.

(2) Parasitic infections (nonbacterial).

In addition to the problem of foodborne illness caused by the many bacterial microorganisms, we must be concerned with other types of microorganisms. These illnesses are more commonly referred to as parasitic infections. Fortunately, outbreaks of foodborne illness due to the several types of parasites are not common in this country, but we should be acquainted with them and know some of their characteristics. Persons returning to the United States from foreign countries may bring these parasites with them.

(a) Amoebic dysentery (amoebiasis).

Amoebic dysentery occurs when moist, high protein foods, such as meat, eggs, poultry, milk and milk products, are contaminated with human feces from infected persons. Water contaminated with sewage is also frequently involved.

The symptom of amoebic dysentery is usually diarrhea of varying severity. The symptom will usually develop within a few days but may take several weeks or months. Occasionally, amoebic dysentery is a fatal disease.

(b) Trichinosis.

Trichinosis is one of the more important of the parasitic infections of concern to the food service worker. It is caused by a tiny worm that infects hogs and other animals we use for food. These tiny worms burrow into the muscle of these animals, and when raw or insufficiently cooked meat containing the live larvae is eaten by man, infection and illness may follow. Although it is not often fatal, there is no known cure and full recovery is slow. Therefore, in the interest of safety, it must be prevented. This can be done easily by properly cooking all pork or pork products. We shall go into the procedures to assure that pork is cooked properly in our next lesson.

(c) Tapeworms.

Infection of humans by the tapeworm of beef, pork, and fish occurs infrequently and is not as serious a problem as that associated with trichinosis. Tapework infections also result from eating the raw or insufficiently cooked meat or products made from infected animals. These infections, too, can be effectively controlled by properly cooking the meat.

(3) Viral infections.

Today, as we learn more and more about transmission of diseases through food, we are finding that disease previously thought to be incapable of being transmitted through food can, in fact, be so transmitted. This is the case of some of the virus diseases. Viruses are microorganisms even smaller than the bacteria and can be seen only by the use of what is known as the electron microscope. There are two and possibly three types of viral infections with which we must be concerned when considering foodborne illness. These are infectious hepatitis, poliomyelitis, and virus of the Coxsackie and ECHO groups.

(a) Infectious hepatitis.

Of the foodborne viral infections, infectious hepatitis probably occurs most frequently. It may occur after eating shellfish, especially raw oysters and clams, harvested from sewage contaminated water. When other foods such as milk, other beverages, and moist food similar to potato salad are involved, the source of the virus is usually either someone who has had the disease or contaminated water. It can be easily controlled by cooking the shellfish, pasteurizing the milk, using safe water supplies, and practicing the safe food handling principles we will be discussing.

(b) Poliomyelitis.

One of the truly great triumphs in public health has been the prevention of polio by the development and use of the Salk and Sabin polio vaccines.

Polio is infrequently transmitted through food, but it can be if we let our safeguards in food handling practices break down. Raw milk is the food most commonly associated with outbreaks of foodborne polio. Personal cleanliness of persons handling milk, pasteurization of milk, and good public health practices will prevent it from occurring.

(c) Coxsackie and ECHO viral infections.

The role of the Coxsackie, ECHO, and other viruses in outbreaks of foodborne illness is not accurately known, but they are viewed with suspicion. As more research is performed, we will find out more about these organisms. In the meantime, if we practice the principles discussed in this course, we will be doing those things that will prevent all types of foodborne illness.

c. Chemical poisoning (intoxication).

Today we live in a world of chemicals, and the chance of consuming, with our food, a chemical that will make a person ill is ever present. Without adequate control and proper use of the many chemicals involved, there would be many more outbreaks of foodborne illness due to chemicals.

Toxic chemicals such as cadmium and zinc (galvanized) have been used to plate food containers and equipment and frequently have been involved in cases of metallic poisoning. Other metals such as antimony, copper, and lead have also been involved. All of these metals may dissolve in certain types of acid foods such as fruit punch drinks, and thereby produce a toxic or poisonous substance. When the food is consumed, the persons consuming them become ill within minutes.

Many of the chemicals used in cleaning and sanitizing solutions are toxic. Also those chemicals we use to control insects and rodents are, by their very nature, intended to kill. If used improperly or accidentally mixed with food or drink, they can cause severe illness and even death in humans. In a later lesson we will discuss the care and handling of cleaning and sanitizing compounds and pesticides in the establishment. It is an important part of food protection.

Today in this country we have the world's most abundant food supply. One factor which makes this so is the fact that we use great quantities and varieties of pesticides on our crops during production of our food supply.

The use of these pesticides is rigidly controlled, especially when the food is to be shipped between States. We must take precautions, however, to make sure that any residue that remains on food is removed during preparation. This can usually be done by thoroughly washing, and by trimming and peeling the food before it is prepared.

It's better to be safe than to be sorry.

d. Poisonous plants and animals.

Certain plants or animals are themselves poisonous and have been mistakenly or accidentally used as food. Some plants, known to be poisonous, that have been associated with outbreaks of foodborne illness are certain mushrooms, toadstools, water hemlock, jimson weed, and the seeds from the castor bean plant. Shellfish such as mussels and clams taken from certain waters at particular times of the year and certain tropical fish have also been involved in outbreaks of foodborne illness. Illness caused by consuming these toxic foods may occur within a few minutes after eating and is often fatal. Cooking the food does not usually destroy the material in the food that causes the illness. The best way to avoid the possibility of eating a poisonous plant or animal is to know your food sources and make sure they are safe. We will speak more about safe food supplies later.

E. Summary

In this lesson, we have become better acquainted with the world of the microorganisms. We have found that they are everywhere about us but that the primary source of those organisms causing outbreaks of foodborne diseases is man himself and the animals he uses as food.

We have pointed out that our principles of sanitation are based upon our knowledge of microbiology. Through an understanding of these basic principles of microbiology and the factors that affect microbial growth, we can understand the real need for maintaining a high level of sanitation in our establishments. As these factors are discussed in later lessons, you will be able to more clearly see how they fit into our scheme of microbiology and its relationship to food protection for the prevention of foodborne illness.

Questions for Use With Lesson 2

MICROBIOLOGY AND FOODBORNE DISEASES

True	*False*		
☐	☐	1.	Sanitary laws and regulations that govern the operation of food service establishments are based upon our knowledge of microorganisms.
☐	☐	2.	Microorganisms that cause outbreaks of foodborne illness multiply rapidly at the normal human body temperature.
☐	☐	3.	Microorganisms that cause foodborne illness include bacteria, viruses, and parasites.
☐	☐	4.	Bacteria are frequently classified according to their shape.
☐	☐	5.	In food protection, the one requirement for the growth of bacteria that we can control best is the temperature of the food.
☐	☐	6.	Disease-producing bacteria have relatively ideal conditions under which to live when they are in food held at room temperature.
☐	☐	7.	All bacteria may be classified as being useful.
☐	☐	8.	Of all the sources of microorganisms, man is by far the greatest source of those that cause outbreaks of foodborne illness.
☐	☐	9.	Only those persons known to be ill carry a disease-producing organism.
☐	☐	10.	Of the 62 diseases that are communicable or that may be transmitted from man to man or animal to man, 25, or 40%, are transmissible through food.
☐	☐	11.	Some bacteria produce a poisonous substance that may make a person ill when eaten.
☐	☐	12.	Foods frequently involved in outbreaks of illness are meats, cream-filled or custard-filled pastries, and salad-type foods such as potato or ham salad.
☐	☐	13.	Animals used for food are frequently contaminated or infected with organisms that cause outbreaks of illness.
☐	☐	14.	There are four major types of foodborne illness.
☐	☐	15.	Foodborne intoxication occurs when certain microorganisms, which may contaminate food, have had the opportunity to grow and produce chemical substances in the food before it is eaten.
☐	☐	16.	When bacteria or poisonous substances contaminate food, a characteristic odor is produced that will tell you the food is contaminated and should not be served.
☐	☐	17.	Outbreaks of foodborne illness are most frequently caused by those organisms that are natural inhabitants of our body.
☐	☐	18.	Persons made ill from eating a contaminated food may in some cases become ill within a few hours after eating whereas others who have eaten similar food may not develop the symptoms for several days.
☐	☐	19.	Milk pasteurization is one of the processes that has resulted in a low occurrence of outbreaks of foodborne illness associated with milk.

True	*False*		
☐	☐	20.	Chemical poisoning associated with food occurs most frequently after drinking fruit-punch-type drinks that have been mixed or stored in containers made from cadmium or zinc.
☐	☐	21.	In a food service operation, there is little need to be concerned with plants or animals that may contain poisonous substances since those substances are destroyed during the cooking process.
☐	☐	22.	Although insecticides are used extensively during the growing of our food supply, we can be assured that no residue will be left on the food because all foods are rigidly controlled by the Federal government.
☐	☐	23.	Outbreaks of foodborne illness are frequently associated with foods that have been leftover, reheated, and served at a later meal.
☐	☐	24.	We are recognizing that viral infections such as infectious hepatitis are involved in outbreaks of foodborne illness.

Lesson Three

Methods for the Prevention of Foodborne Disease

Page

Lesson Plan 36

Lesson Manuscript 37

Principles to be Taught 37

Introduction 37

Methods by Which Microorganisms are Spread in Food Establishments and to Man 37

Methods for the Protection of Food to Precent Foodborne Illiness 39

Methods to Control Spread of Disease Through Food: The Four Basic Rules of Food Protection 45

Summary 46

Lesson Plan No. 3

Principles to be Taught

How food is contaminated by microorganisms and toxic substances

Methods for the protection of food to prevent foodborne illness

A. Introduction

B. Methods by Which Microorganisms are Spread in Food Establishments and to Man

1. Two primary channels for transmission of agents of foodborne illness.
    - a. Transmission through food.
    - b. Transmission to food by utensils and equipment.
2. Sources by which food and utensils and equipment can be contaminated.
    - a. Unclean hands.
    - b. Carriers and infected persons.
    - c. Improperly washed fruits and vegetables.
    - d. Improperly washed and sanitized utensils, tableware and equipment.
    - e. Improper handling and storage of food or utensils and equipment.

C. Methods for the Protection of Food to Prevent Foodborne Illness

1. Personal hygiene.
2. Food service workers free from disease.
3. Food secured from approved sources.
    - a. Safe water sources.
    - b. Safe milk sources.
    - c. Safe meat sources.
    - d. Safe canned foods.
    - e. Approved sources of shellfish.
4. Proper storage for the protection of foods.
    - a. Protection during dry storage.
    - b. Wet storage of packaged food prohibited.
5. Temperature and its relation to food protection.
    - a. Optimum temperature for microbial growth and the danger zone for holding food.
    - b. Cold prevents or retards bacterial growth.
    - c. High temperature destroys bacteria.
    - d. Motto for temperature control in food protection.
6. Proper practices for refrigeration of foods.
    - a. What foods must be refrigerated.
    - b. Periods of refrigeration.
    - c. Thawing of frozen foods.
    - d. Arrangement of food in containers and refrigerators.
    - e. Cleaning of refrigerators.
    - f. Refrigerator thermometers.
7. Proper practices for the preparation of food.
    - a. Clean hands.
    - b. Clean equipment.
    - c. Clean practices.
    - d. Clean fruits and vegetables.
    - e. Avoiding leftovers.
    - f. Proper cooking of foods.
        - (1) Pork and pork products.
        - (2) Poultry and poultry products.
    - g. Display and service.
        - (1) Cold foods.
        - (2) Hot foods.
        - (3) Serving of foods.
        - (4) Unpackaged foods.
        - (5) Single-service utensils.

F. Methods to Control the Spread of Disease Through Food: The Four Basic Rules of Food Protection

1. Keep food clean.
2. Keep food cold.
3. Keep food hot.
4. Don't keep food in the danger zone.

G. Summary

Lesson Manuscript No. 3

Principles to be Taught

How food is contaminated by microorganisms and toxic substances

Methods for the protection of food to prevent foodborne illness

A. Introduction

So far in this course we have learned that bacteria are minute single-celled plants that have different shapes and a variety of growth characteristics or habits. We have learned that bacteria and other microorganisms are everywhere about us and that there are numerous sources from which disease-carrying bacteria and other microorganisms may be transmitted or carried to food. These sources, as we learned, are often found to be rodents and insects, the animals we use as food, and man himself. We have also learned about specific diseases that may result when we consume food contaminated with pathogenic microorganisms.

In this lesson we shall discuss how microorganisms are spread in food establishments and to the consumer. We shall also learn the methods that we, as food service workers, can use to prevent this spread and at the same time prevent the growth of microorganisms or destroy them entirely. By knowing these facts, you will become more appreciative of the importance you play in the prevention and control of foodborne illness and in the serving of a wholesome, safe and tasty food to the consumer, yourself, and fellow workers.

B. Methods by Which Microorganisms Are Spread in Food Establishments and to Man

You will recall that we said microorganisms could not move about by themselves. Since they cannot move from place to place alone, there must be ways or methods by which they are transported or moved into and throughout the establishment, and, subsequently, to man to cause a case of foodborne illness.

To control the spread or transmission of microorganisms, we must know how this transmission takes place. This, then, is the question for which we must find an answer.

How are microorganisms and other toxic substances which cause outbreaks of foodborne illness transmitted from their source to man?

1. Two primary channels for transmission of agents of foodborne illness.

Although there are a number of ways in which microorganisms and toxic substances may be transmitted to man, we shall consider only the principle ways by which this occurs in food establishments.

a. Transmission through food.

Food, of course, is the one factor common to all our work, regardless of where or in what type of food establishment we work. Since food can easily become contaminated and under appropriate conditions can afford an ideal environment in which microorganisms can grow and multiply, disease-producing microorganisms may frequently be taken into the body with the food we eat. Even though there may be huge numbers of these organisms present in the food, the taste or appearance most likely will not be changed in any way. Food accidentally or mistakenly prepared from poisonous plants or with toxic chemicals have in many instances made people ill. Therefore, we can see that food itself is the primary source for the transmission of disease-producing agents.

b. Transmission to food by utensils and equipment.

We have learned that microorganisms are all about us. Since they are so widely distributed in our environment, it is possible for them to quickly and easily contaminate the food we eat and the utensils and equipment we use to prepare and serve that food. Equipment such as spatulas, tongs, pots, pans, mixers, slicers, grinders, and even working surfaces must not be overlooked when we are considering cleanliness. If such equipment is not cleaned and sanitized after becoming soiled or contaminated, any disease-producing organisms on the surfaces of the equipment have an excellent opportunity to gain entrance to the food during preparation.

In addition, those items such as forks, spoons, knives, glasses, and other utensils that people place into their mouths may be a direct source of a disease agent if they have not been properly washed and sanitized after use or if they have subsequently become contaminated.

2. Sources by which food and equipment and utensils can be contaminated.

Contamination of food and equipment and utensils with microorganisms may occur from many different sources. If we recognize the more important sources from which this contamination occurs, we can be better prepared to prevent the major part of the outbreaks of foodborne illness and, at the same time, serve a cleaner food to the consumer.

a. Unclean hands.

Food becomes contaminated from unclean hands probably more frequently than by any other methods; because bacteria are found everywhere, our hands are continuously touching or coming into contact with contaminated articles. We know that we must touch some food or food containers during food preparation. Therefore, if we fail to wash our hands before beginning work, after visiting the toilet, after cleaning soiled equipment, soiled dishes or utensils, or before preparing or serving food, we are most likely contaminating the food with disease organisms that may make the consumer ill. The old counter towel on which hands are "wiped" between jobs should not be considered adequate hand washing.

b. Carriers and infected persons.

Another important source by which food becomes infected or contaminated is from persons who are carriers of a disease or from those infected with a disease.

A carrier is a person who may be infected with a disease and not exhibit any of the outward symptoms of that disease. A carrier may have just recovered from the disease or the disease organism may not have made him ill. He will, however, be harboring the disease organism in or on his body and will be shedding that organism. Thus, a person may be a source of foodborne infection and not even know about it. Diseases such as typhoid fever, salmonellosis, and staphylococcal food poisoning can be caused by the transmission of the organisms by carriers. Anyone who is a suspected or known carrier of a disease should not be permitted to work preparing or serving food until he has been cleared after examination by a physician.

If a carrier, the person who does not show the symptoms of the disease, can spread a disease, a person suffering from an obvious communicable disease is a more important consideration in the control of foodborne illness. We are all ill at one time or another with an illness that can be transmitted through food. Because of this, and because man himself is a major source of the organisms that cause foodborne illness, persons who are carriers or who are obviously ill from a cold or who have an infected cut, boil, skin rash, or other infectious disease, should not work with food. Rather, if they must work, they should be assigned to an area such as clean-up or maintenance so they will not come into contact with food.

c. Improperly washed fruits and vegetables.

In this country, we are fortunate that we have an abundance of agricultural commodities grown under conditions that permit assurance of relatively safe foods. We are to be thankful that we can eat just about any type of fresh fruit or vegetable we desire without risking an intestinal upset as is the case after consuming such foods in many foreign countries. Even though we have assurance that we are buying quality vegetable products, we still must take precautions to see that they are properly washed and handled during preparation.

Today, the vegetable products served in your restaurant come from all parts of the United States: lettuce may come from California, tomatoes from Florida or Texas, and potatoes from Idaho or Maine. These may have been grown on irrigated land and were most likely treated with a pesticide to control insects. Therefore, we must be sure that vegetables, especially those eaten raw, either alone or in salads, have been thoroughly washed to remove any organism or substance that could cause illness.

d. Improperly washed and sanitized utensils, tableware, and equipment.

Both the food and the customer are continually coming in contact with various utensils and pieces of equipment within our establishment. Food is prepared and stored in many types of utensils and equipment. The consumer places tableware such as forks, spoons, and glasses in his mouth. If these utensils, tableware and equipment have not been thoroughly washed and sanitized since they were last used, or if they should become recontaminated after being cleaned, they may well carry to the food and on to the customer, organisms which may make him ill. Also, should a customer find residues of dried food or other soil, such as lipstick, on his utensils, it could mean a lost customer since soiled table service may establish in the diner's mind a poor attitude toward the establishment.

Such an attitude by the diner may not be the fault of a single individual, but may reflect upon the job being done by several persons: the owner for not providing adequate dishwashing facilities; maintenance personnel for not keeping the dishwashing machines in proper operating condition; the person responsible for the dishwashing operation for not removing and rewashing improperly washed utensils as they came from the dishwasher; and the waitress or person responsible for not making certain that all table service was clean. This is but one example illustrating that the prevention of foodborne illness is a team effort. At the same time, the employee who does an effective job is helping management impart to the diner a better attitude toward the establishment.

e. Improper handling and storage of food or utensils and equipment.

Even though we have purchased safe and wholesome food for use in our establishment and have properly washed and sanitized the utensils and equipment used to prepare and serve that food, these items may become contaminated if we do not use proper precautions to protect them from recontamination during storage or after being washed and sanitized.

Our objective then is to keep food clean, wholesome, and free from spoilage and contamination. To do this we must be constantly on guard to prevent a "slip-up" of any procedure or practice over which we have control, be it with the raw product, during storage or preparation, washing and sanitizing utensils, or the general operation of the food service establishment. Only in this manner can we prevent possible transmission of a disease to ourselves or the consumers.

C. Methods for the Protection of Food to Prevent Foodborne Illness

Because there are so many sources from which disease agents may be transmitted to food and because food can become easily contaminated by these disease organisms, food must be protected at all points along the food chain, from the time it is produced until it is served to the consumer. This not only involves a great number of people, it also involves a great many procedures that must be followed if proper protection is to be given the food supply. Our concern then is to learn about the procedures and practices that we must follow, and once learned, to apply them continuously when we are working in any capacity associated with preparing and serving food.

1. Personal hygiene.

The principles of food protection begin with the individual food worker. You will recall that we mentioned during our first session the importance of the individual's role in the application of the principles of sanitary food preparation and service. We know that the "human element" is the single most important factor in the control of foodborne illness. This significant role begins with the habits of personal hygiene that the food service worker practices. We will not go into these habits now, but we will spend considerable time discussing habits in a later lesson.

2. Food service workers free from disease.

Not only must food service workers have good habits of personal hygiene if they are to work preparing or serving food, but they must also be free from all communicable diseases.

As we have learned, many of the diseases transmissible through food are carried by man himself. None of us would want to cause another person to become ill with a disease we may be harboring in our bodies. Therefore, it is important that we be healthy individuals when we work in a food service establishment. In a later lesson we will discuss more about what we can do to assure ourselves that we are free from disease.

3. Food secured from approved sources.

The safety and wholesomeness of food is a basic requirement for the protection of the consumer's health. Although you as operators or employees of a food service establishment have little direct control over the conditions under which food is produced, you do have control over the sources from which you purchase the products. Therefore, all food in food establishments should be from sources approved or considered satisfactory by the health authority. The industry should feel free to ask Federal, State, or local agencies about food sources. All food should be clean and wholesome, free from spoilage, adulteration, and misbranding, and otherwise safe for human consumption.

With food products coming from all sections of the country and even the world, how can we determine safe food sources? Really, this is not so difficult when we consider the vast network of people and programs, specifically the U.S. Public Health Service, the U.S. Department of Agriculture, and State and local health and agriculture agencies, concerned with protecting our food supplies.

a. Safe water sources.

Although water is not thought of as a food, in the true sense of the word, disease can be transmitted by water containing pathogenic organisms, through foods prepared with the use of contaminated water, or by utensils and equipment washed with contaminated water. Municipal water supplies can usually be considered safe and should be used exclusively whenever they are available. These supplies are under routine surveillance and testing. If a private well or water supply is used, the water also should be periodically tested for freedom from pathogenic organisms.

b. Safe milk sources.

Most foods will support microbiological growth; however, milk, considered nature's most perfect food, is the one food that is considered to be especially critical as a vehicle of foodborne disease. Because of effective milk sanitation programs, the number of outbreaks of foodborne illness caused by milk or milk products have been relatively small in recent years. We want to keep it that way. In fact, milk has been associated with less than 3% of the more than 200 outbreaks of foodborne illness reported in the United States each year.

Although a few communities may still permit the sale of raw or nonpasteurized milk, all fluid milk or fluid milk products, such as coffee cream, half and half, and whipping cream, should be pasteurized Grade "A" products. It is only by the continuous use of Grade "A" pasteurized milk and milk products that we can prevent foodborne illness attributed to milk.

c. Safe meat sources.

We have said that foodborne illness can be spread from an infected animal to humans; therefore, it is important that all meat or poultry come from healthy animals that have been slaughtered and processed in a sanitary manner. We can be better assured of this when all the meat and poultry products we purchase bear the label of an official inspection agency, such as that of the U.S. Department of Agriculture, the State or local health department, or other regulatory agency. Our responsibility, then, is to see that these products will be properly stored and handled in the establishment.

d. Safe canned foods.

Improperly canned foods have been frequently involved in outbreaks of foodborne diseases. Low-acid, canned foods, such as corn, beans, and canned meats, that have been prepared in the home have often been incriminated. Many of these outbreaks have involved the deadly botulism. To assure the safe quality of canned foods, only those processed in a commercial food processing plant should be used. Home-canned products should never be used in a public food service establishment.

e. Approved sources of shellfish.

Our modern methods of food processing along with our rapid distribution systems make oysters and other shellfish readily available to all areas of the country. Waters in which shellfish are grown, especially oysters, clams, and mussels, are subject to pollution by sewage. Shellfish harvested from polluted areas are frequently contaminated by disease-producing organisms. Typhoid fever, infectious hepatitis, and other diseases can easily be transmitted through contaminated shellfish. To avoid the possibility of purchasing shellfish harvested from polluted waters, the shellfish should be from sources approved by the State shellfish authority and be properly identified by the name and certification number of the original shellstock shipper.

Fresh and frozen shucked oysters, clams, and mussels should be properly identified on the package by a certification number issued by the State shellfish control agency of the State in which the shellfish is packaged. Semi-monthly a list of these certification numbers along with the name of the shipper or packer is published and widely distributed by the Public Health Service. By checking the number on the container or the package against this list, or in requesting the health department to do so, we can be better assured of receiving wholesome shellfish.

4. Proper storage for the protection of foods.

The protection of the foods we purchase for preparation and serving to the customer has been the responsibility and under the control of other people until they are received in the establishment. At this point in the food chain, the receipt by the food establishment, the sole responsibility for the proper protection of the food during storage, preparation, holding for service, and the final service becomes that of the employees of the establishment.

We do not usually prepare and serve food immediately after purchase; therefore, it must be stored for varying lengths of time and under a variety of conditions until it is prepared for service. After preparation, food again is usually held or stored until final service to the consumer. At each of these points the food is subject to contamination in a multitude of ways unless proper protection is provided. Also, any organism contaminating the food has the opportunity to grow if the proper storage conditions are not provided.

Generally, storage of incoming foods will be handled by one of two methods. Nonperishable foods, such as canned goods, flour, sugar, and other staple food items—as well as paper goods and supplies—will be placed in dry storage. Perishable products, such as fruits and vegetables, and potentially hazardous foods, such as meat, poultry, eggs, and similar foods, will be placed in refrigerated storage.

a. Protection during dry storage.

The protection of food from contamination during storage is the beginning of the protection in the establishment. Food placed in dry storage should be so arranged and stored that the food placed in storage first will be used before newer incoming supplies. The motto is "First in, first out." All foods should be stored off floors on pallets or shelves and, if possible, away from walls. This type of storage permits easy access for cleaning floor, walls, and corners, eliminates harborage for insects or rodents, and raises food off the floor, preventing contamination from flooding if a floor drain becomes stopped up or some other plumbing fixture overflows as a result of sewer blockage.

Overhead sewers should not be permitted in storerooms. Such sewers may leak, dripping sewage onto containers of food stored beneath them.

b. Wet storage of packaged food prohibited.

In some areas it has been the practice to store packaged foods such as cartons or bottles of milk, orange drinks, and soft drinks in iced water to keep them cold. This practice should not be permitted because the water in which the food container is stored often is contaminated through use and from the soiled outsides of the container. The dirty water may enter the food through a leak in the container, thereby contaminating the food inside, or, in pouring from the container, contamination may be washed into the glass.

5. Temperature and its relation to food protection.

You will recall that in our second lesson we discussed some of the requirements necessary for the growth of microorganisms. We discussed four of these as being most important: food, moisture, temperature, and time. As we pointed out, we have little opportunity to control the first two of these requirements and depend most upon controlling the temperature of food to control microbial growth.

a. Optimum temperature for microbial growth and the danger zone for holding food.

You will recall that we pointed out that most disease-causing microorganisms grow best at temperatures near that of the human body or about 100°F. Actually, disease organisms will grow over a wider range of temperatures, and this is why a danger zone of temperatures has been established. This zone ranges from 45° to 140°F.[1]

b. Cold prevents or retards bacterial growth.

We know that if we keep food at a temperature of 45°F, or below, microorganisms will not grow very well and usually cannot reproduce in sufficient numbers to cause illness. We have to remember that this temperature, or even freezing, will not kill most microorganisms but only slow down or halt their growth temporarily. If the temperature rises significantly we can be sure any organisms present in the food will begin to grow.

c. High temperatures destroy bacteria.

The upper limit of our danger zone is 140°F. Therefore, if we are to hold foods for serving hot, they must be held at or above this temperature. Most organisms in food held at 140°F, or above, are killed rapidly but are not readily affected when the temperature goes much below 140°F or into the danger zone. So we can see that after food is cooked, it should be kept really hot —not just warm until served. If it is kept "just warm" on the back of the kitchen range or on the steam table, rapid microbial growth may occur and an outbreak of foodborne illness could result.

To be sure that you are maintaining the correct temperature, use a reliable thermometer.

---

[1] The Manual of Naval Preventive Medicine, NAVMED P-5010, and the Air Force Manual 161-6 require perishable food to be kept at 40°F and below or at 140°F and above.

d. Motto for temperature control in food protection.

We in public health have long had a motto for food protection. You may have heard it before. It is very simple, a motto to remember and practice. It is: "Keep food hot" (140°F or above); "keep food cold" (45°F or below); or "don't keep it long."

It means just what it says and, when followed, can assure us that the food we serve will be safe. All too frequently we fail to practice, or "fudge on," this little motto.

6. Proper practices for refrigeration of foods.

Although we take the necessary precautions to protect food from contamination during preparation, we must remember that these precautions can never be carried out with 100 percent efficiency and that contamination of food does occur.

If the motto just learned about temperature control is kept in mind, we can see immediately that there is a way to readily control the growth of any organisms that may contaminate the food. Therefore, let us look at some of the practices that we must follow during refrigeration of food.

a. What foods must be refrigerated.

Foods such as fresh fruits and vegetables need be refrigerated only to maintain their quality and shelf life, but potentially hazardous foods—those that contain meat or meat products, eggs, milk, or other high protein foods—must be maintained at a temperature of 45°F or below unless we are holding them at a hot temperature for serving. Then they must be held at 140°F or above.

b. Periods of refrigeration.

Foods must be refrigerated at all times except during the period of actual preparation or serving. Hot foods when removed from the range after cooking or from the steam table should be placed in the refrigerator immediately. Some people think this may cause the food to "sour," but it will not harm the food in any way. By placing hot or warm food in the refrigerator immediately, we can shorten considerably the length of time it will be in the danger zone, thereby limiting the chances for the growth of any bacteria that may be present in the food.

c. Thawing of frozen foods.

Frozen foods need special consideration both during storage and during the thawing process.

Frozen foods should be kept frozen at all times until they are removed from the freezer for preparation. They should be held in a refrigerator at 45°F or less until thawed and never should be thawed at room temperature.

Since this may be time-consuming, a more rapid and acceptable method of thawing food involves placing the food in a clean plastic bag and suspending in it in *running* cool (70°F or less) tap water until thawed. In the case of frozen foods without protective wrappers, such as meats and poultry, this method will prevent leakage of the product and other undesirable changes. Such bags should not be reused, and the thawed food should be promptly cooked.[2]

Quick thawing as part of the cooking process is acceptable for those foods that require no preparation before cooking. Additional time must be allowed for this method of preparation to be sure that the proper temperature has been reached in the center of the food.

d. Arrangement of food in containers and refrigerators.

Many factors affect the rate at which food cools. Among these are the amount of food in the container, the shape of the container, the thickness or density of the food, the velocity of the cooling medium (air movement), and whether the food is stirred during the cooling.

Small amounts of food cool more quickly than large quantities. Food stored in shallow pans or in the smaller round containers will cool more rapidly than food stored in deep or large containers. This practice permits more rapid removal of heat from the food mass, thereby bringing the entire quantity of food to the proper temperature of 45°F, or below, much sooner. When stored in containers such as large stock pots, it takes much longer for the food to cool, and it may be in the danger zone between 45°F and 140°F for several hours, permitting any microorganisms present to grow.

A good rule of thumb to follow when storing containers of food in a refrigerator is to make certain that the distance to the center of the food is no greater than 2 inches. This means that shallow pans or even round containers would be filled no more than 4 inches deep.

Cooling of the food in the container will also be much more rapid if the contents are stirred occasionally. This brings the warmer parts of the food mass closer to the surface, permitting the heat to be dissipated more rapidly. Liquid or semi-liquid food, such as gravies and cream filling, can be cooled even more quickly by placing the container in cool water and stirring the contents. Of course, when the temperature of the food has been lowered sufficiently, the food should be placed in the refrigerator immediately and not be permitted to remain at room temperature.

---

[2] Air Force regulations prohibit this method of thawing.

Refrigerators depend upon the circulation of cold air about the food to cool the food properly. Therefore, food and containers, must be placed in the refrigerator in a manner that will permit proper air circulation around each of the containers.

Space along the side and back should be left so that the air can move and circulate freely. Food containers such as square boxes should not be packed tightly together but spaced so that there will be cracks between each row.

Shelves should not be covered. Covers prevent or inhibit air circulation, reduce the cooling capacity of the refrigerator, and may overload the refrigeration unit, adding to the operating expenses.

All containers of food in the refrigerator should be kept covered or wrapped to prevent contamination from falling from the shelf above into the containers below.

e. Cleaning of refrigerators.

Refrigerators should be cleaned thoroughly with a detergent and then sanitized. This not only assists in preventing mold and mildew, but eliminates the accumulation on the shelves of soil that may drop into food. Walk-in and reach-in refrigerators should receive equal attention. An established schedule for cleaning should be followed and supplemented as needed with more frequent cleaning.

f. Refrigerator thermometers.

A reliable thermometer should be kept in the warmest part of the refrigerator. The performance of the refrigerator can then be checked during various load conditions and adjustments made when necessary.

7. Proper practices for the preparation of food.

We have said that, even though certain practices prevent food from becoming contaminated with disease-producing organisms, it is virtually impossible for these practices to be 100% effective. However, we want to make them as perfect as possible. Therefore, let us discuss some of the practices that we can follow to make these precautions more effective.

a. Clean hands.

Avoid unnecessary hand contact with food. Whenever possible food should be handled with clean utensils, such as tongs, scoops, spoons, or forks. We frequently see food service workers unnecessarily using their hands to serve food such as butter slices, ice cubes, and bread—just to name a few. Of course, many foods must be handled during preparation, but, if we practice using utensils in handling more food, we will find that it can be done just as conveniently and quickly as with the hands alone. For example, tongs or scoops can easily be used for handling ice, and forks or tongs for serving butter or for handling slices of meat. These practices are not only more sanitary, but are more appealing to the consumer and show him that you are concerned about his health.

When it is necessary to use the hands, we must make sure they are kept clean. Hands must be washed often with warm water and soap to keep them clean, particularly when changing from one type of activity to another. We will be talking more about this very important subject in our next lesson. Also, we should consider using single-service plastic gloves when it is necessary to handle food extensively, as in the boning of chickens.

b. Clean equipment.

Just as it is important that we have clean hands for the preparation of food, it is also important that we use clean utensils.

Food contact surfaces of tables and equipment used to prepare all raw foods, especially meats and poultry, should be thoroughly and completely cleaned and sanitized before being used to handle cooked foods. We must remember that once a piece of equipment becomes contaminated, and is not cleaned before handling other food, the new food prepared with it becomes contaminated. Meat slicers, saws, grinders, and equipment used frequently throughout the day must receive special attention. Clean them often during the day to make sure they do not contribute to an outbreak of foodborne illness.

The need for cleaning equipment such as slicers and meat grinders frequently during the day is illustrated by two large outbreaks of foodborne illness. One was a typhoid fever outbreak that occurred in Scotland; the other was an outbreak of salmonellosis that occurred in a large metropolitan area in this country. In both outbreaks, meat that was contaminated with the disease organisms was prepared on meat slicers that were used later to slice other meats.

These outbreaks caused more than 400 cases of typhoid fever and nearly 350 cases of salmonellosis. Prompt and thorough washing and sanitizing of the slicers between uses would have prevented these outbreaks from occurring.

c. Clean practices.

Habits of individuals are most important in providing proper protection during food preparation. Remember that we have said that bacteria are everywhere—on the skin, in the nose, on the hair, and in our bodies. We will discuss personal habits in our next lesson; however, such habits as placing our fingers in the hair, picking at the nose, smoking, or coughing and sneezing are to be avoided when preparing food.

d. Clean raw fruits and vegetables.

The importance of thorough washing is obvious when we recall that raw fruits and vegetables have been grown under unknown conditions and handled by many people. They may be contaminated by insecticides used to control pests. They may have become contaminated by disease organisms or toxic chemicals during the growing period, during transportation, and at many other points along the food chain.

Cleaning is especially important for those fruits and vegetables that are eaten raw.[3] Soaking, followed by thorough washing of all portions in running water, is usually sufficient to remove most chemical contaminants or disease organisms that may be present.

e. Avoiding leftovers.

Freshly prepared foods are more appetizing than leftovers. Food that is kept for a long time between preparation and serving is more likely to cause disease. Usually, leftover foods in small amounts wind up being discarded without being used but have taken up space in the refrigerator in the meantime. If you do keep leftover prepared foods (unserved) and raw ingredients, adequately protect and promptly refrigerate them. Remember that leftover foods are frequently involved in outbreaks of foodborne illness.

f. Proper cooking of foods.

If bacteria are to be destroyed by the heat of cooking, it is necessary that all parts of the food reach the proper temperature.

Some foods, such as those of a solid or viscous nature, heat slowly and must be stirred frequently to heat properly. The principles that apply to cooling food rapidly also apply to the heating of food. Foods must be heated through the danger zone of 45° to 140°F as quickly as possible.

People have preferences as to how completely their food is cooked. An example of this would be beef cooked to a rare or medium rare condition. However, with certain foods, we must make sure that they are cooked to specific temperatures if we are to be assured that the disease organisms frequently associated with them have been destroyed.

(1) Pork and pork products.

Pork and pork products are the source of the trichina worm that causes trichinosis. Trichinosis can be readily prevented by heating all pork and pork products until the meat is white or has reached an internal temperature of 150°F. Temperatures below this will not usually destroy the trichina worm. Use a thermometer inserted to the thickest portion of the meat to be sure that this temperature has been attained throughout the entire mass.

(2) Poultry and poultry products.

Poultry and poultry products are a principal source of the organism that causes salmonellosis. Since a large percentage of these products are contaminated, we can be sure of proper protection if they are cooked to an internal temperature of at least 165°F. Here again, use a thermometer to be sure that the required temperature has been attained.

g. Display and service.

Food that is being held for service must be stored or displayed in such a manner that employees or customers cannot contaminate it by sneezing, coughing, or by unnecessary handling.

In cafeteria or buffet-type service, for example, the display of food must be protected by appropriate guards to prevent droplets from customer's coughs and sneezes from falling into the food and contaminating it. On self-service lines, only small openings should be provided in the guards. This makes it possible for the customer to help himself but prevents him from reaching for the back dish or from picking up dishes for closer inspection. Such handling or reaching over may contaminate the food with bacteria.

---

[3] In overseas areas, Armed Forces food service personnel must disinfect fruits and vegetables, using procedures specified by local command regulations.

In counter service establishments, pies, doughnuts, or unpackaged food must not be lined up along the back edge of the counter where they may be easily contaminated by the customer's sneezing or coughing, or may be touched by the customer.

We must remember, also, that our motto about keeping foods applies equally well to those being held for display and serving.

(1) Cold foods.

Cold foods on a serving line must be maintained at a temperature of 45°F or below. This should be the temperature of the food and not that of the ice or cold plate on which the food is placed.

(2) Hot foods.

Hot foods on a serving line must be maintained at 140°F or above. Remember, this is the temperature at which the food must be held and not the temperature of the heating unit. Again, use a thermometer to be sure that these temperatures are being maintained.

(3) Serving of foods.

All foods, including ice, bread, butter, patties, etc., should be handled only with an appropriate utensil. Get into the habit of using utensils, and their use will become second nature.

(4) Unpackaged foods.

Food, once it has been served to the consumer, is not to be offered for resale. This includes bread. Packaged foods such as sugar, crackers, or other individual servings that have not been opened may be served again. Jams, jellies, and condiments should be individually packaged or in a covered container.

(5) Single-service utensils.

Many single-service items have the appearance of being suitable for multiuse. Single-service items are just what their name implies. They are to be used once and then discarded.

For maximum protection of these items, they should be individually wrapped. This is especially important if the articles are placed out for customer self-service without an appropriate dispenser.

F. Methods to Control Spread of Disease Through Food: The Four Basic Rules of Food Protection

We have pointed out many measures or precautions that we must practice in applying the principles of food protection. However, if we stop and consider these practices, we can classify them into four basic rules. They follow closely our motto about the temperature of food.

1. Keep food clean.

The first of our four rules is to keep food clean. Under this rule we would include cleanliness of the storage area and how it affects the food.

We would also include the cleanliness of the food preparation area. Probably most important would be cleanliness in the handling of food during preparation and serving.

2. Keep food cold.

The second of our four rules is to keep food cold. Since we cannot completely prevent the contamination of food, the control of the temperature of the food plays a significant role in the prevention of foodborne illness. Although the specific temperature at which food may be stored varies according to the product, we must make sure that we store potentially hazardous food at or below 45°F to assure ourselves that the proper temperature that will prohibit the growth of disease organisms is being maintained.[1]

3. Keep food hot.

The third of our four rules is to keep food hot. By hot we mean at least 140°F when we are holding a hot food for serving.

In cooking certain foods, we know that we must have temperatures higher than 140°F to assure proper protection. These temperatures are 150°F for pork and pork products and 165°F for poultry and poultry products. These are the temperatures at the center of the food and not on the surfaces or the cooking or holding units.

4. Don't keep food in the danger zone.

Our fourth basic rule of food protection is *not* to hold food at those temperatures that permit microorganisms to grow. You will remember that these temperatures are in the danger zone, which ranges from 45° to 140°F.

---

[1] Air Force Manual 160-6 indicates chilled meats, meat products, milk, milk products, eggs, and those ingredients of sandwich meats that consist of any of the foregoing will be stored in a refrigerator maintained between 36° and 40°F.

To assure ourselves and the consumer of adequate protection, we must heat or cool foods through this zone as rapidly as possible and hold foods there only as long as actually necessary during preparation.

G. Summary

In this lesson we have discussed how bacteria are spread in food establishments and to man.

We have also learned about many of the principles and procedures that we as individuals must practice to provide proper protection to food so that we can prevent the transmission of any illness through the food that we may serve.

We have learned that, if we apply four basic rules of food protection, we can more adequately protect the health of the customer and ourselves as well.

In our next lesson we will discuss at some length what you as an individual food service worker can do to improve your performance on the job for the benefit of yourself, your employer, and the consumer of the food that you serve.

Questions for Use with Lesson 3

METHODS FOR THE PREVENTION OF FOODBORNE DISEASE

True	*False*		
☐	☐	1.	Of the diseases known to be transmissible to man, only a very few can be transmitted through food.
☐	☐	2.	An abrupt onset of symptoms following the consumption of food is usually one of the prominent characteristics of foodborne illness.
☐	☐	3.	Food that is involved in an outbreak of an illness usually has a characteristic odor or color related to the type of illness that it causes.
☐	☐	4.	It can be assumed that low-acid type of home-canned food is as safe as similar types of commercially canned foods.
☐	☐	5.	One of our most frequent types of foodborne illness outbreak is that associated with the staphylococcal organism.
☐	☐	6.	Several types of bacteria that live in the intestinal tract of man may cause outbreaks of foodborne illness.
☐	☐	7.	There is no need for a food service employee to be concerned about chemicals as a cause of foodborne illness.
☐	☐	8.	Many of the chemicals used in a food establishment for cleaning and sanitizing are toxic and can make a person ill.
☐	☐	9.	Unclean hands play an important role in the transmission of foodborne illness.
☐	☐	10.	Since our food supply is one of the safest in the world, there is little need to be concerned with the washing of vegetables used in our food establishments.
☐	☐	11.	Improperly washed dishes or utensils may be an important factor in how the customer rates your establishment as a place to eat.
☐	☐	12.	The principles of food protection begin with the individual food workers.
☐	☐	13.	Since most of the food served in a food establishment is cooked, there is very little need to be concerned about the source from which that food is obtained.
☐	☐	14.	Generally we can be assured that food from commercial source is safe.
☐	☐	15.	Improperly processed foods have been frequently involved in outbreaks of foodborne illness.

True	***False***		
☐	☐	16.	There are only a few points in the production and preparation of most food at which it may become contaminated with disease organisms.
☐	☐	17.	Keeping hot foods "warm" on the back of a range or on a steam table while they are being held for serving is a safe practice.
☐	☐	18.	When considering food protection, we think of the danger zone as the temperature range between 45° and 140°F.
☐	☐	19.	When keeping food cold, it is necessary to keep it refrigerated at 45°F or below at all times except during the period of actual preparation and serving.
☐	☐	20.	Hot food placed in a refrigerator immediately after being removed from cooking or from a steam table has a tendency to "sour."
☐	☐	21.	Small containers or volumes of food cool faster than larger containers or volumes of the same food.
☐	☐	22.	It is an acceptable practice to thaw frozen foods at room temperature.
☐	☐	23.	It is always necessary to contact food with our hands while it is being processed or prepared.
☐	☐	24.	There is little need to clean equipment such as slicers, grinders, or mixers during the day since these types of equipment are frequently being used in preparing food.
☐	☐	25.	Habits of individuals are most important in providing proper protection during food preparation.
☐	☐	26.	It is usually a good practice to save small amounts of leftover foods since they can conveniently be added to stews, casseroles, and similar dishes.
☐	☐	27.	When cooking poultry or poultry products, it is necessary to make certain that the internal temperature of the product reaches 165°F.
☐	☐	28.	To assure that we have practiced the proper food protection principles, the food handler must make sure that food is heated or cooled through the danger zone (45° to 140°F) as rapidly as possible.

Lesson Four

Personal Hygiene, Self-Protection, and Salesmanship

Page

Lesson Plan 50

Lesson Manuscript 51

  Principles to be Taught 51

  Introduction 51

  Significance of Personal Hygiene in the Prevention of Foodborne Disease 51

  Rules or Practices of Personal Hygiene 51

  Rules or Practices of Personal Habits 52

  Rules for Working Habits 53

  Personality Factors and Salesmanship 54

  Summary 55

Questions 56

Lesson Plan No. 4

Principles to be Taught

Importance of observing good personal hygiene

Role of food service worker in preventing transmission of foodborne disease

Importance of developing and practicing proper work habits

Personality factors and salesmanship

A. Introduction

B. Significance of Personal Hygiene in the Prevention of Foodborne Disease

C. Rules or Practices of Personal Hygiene

1. Rules or practices of personal health, cleanliness, and appearance.
    a. Regular physical examinations.
    b. Personal cleanliness and appearance.
    c. Cleanliness of clothing.
2. Relationship of appearance and health.

D. Rules or Practices of Personal Habits

1. Personal habits to avoid.
2. Personal habits to remember.

E. Rules for Working Habits

1. Rules for handling clean utensils and equipment.
2. Rules for handling soiled utensils and equipment.

F. Personality Factors and Salesmanship

1. Food service is more than providing food.
    a. Providing service and satisfaction.
    b. Selling esteem.
2. Traits for improving customer relationship.
    a. Courtesy to patrons.
    b. Cheerful attitude.
    c. Promptness.
    d. Attention to wants and needs of diner.
    e. Efficiency.
    f. Willingness to assist fellow employees.
3. Results of attention to patron's wants.
    a. Patron satisfaction.
    b. Good management and employee relationship.
4. Employee traits that lead to better business.
    a. Interest and initiative in doing a good job.
    b. Respect and loyalty for employer.

G. Summary

Lesson Manuscript No. 4

Principles to be Taught

Importance of observing good personal hygiene

Role of food service worker in preventing transmission of foodborne disease

Importance of developing and practicing proper work habits

Personality factors and salesmanship

A. Introduction

In our last lesson, we discussed the many factors that make up the practices we must follow for the proper protection of the food we serve to our customers. We learned that there are many ways in which food may become contaminated. We discussed the precautions we must take to protect food from the time it comes into the establishment until the time it is served to the consumer. We found that the individual plays a significant role in the application of proper food protection principles. We learned at the end of our lesson that there were four basic rules under which we might classify the principles of food protection. These rules were: "keep food clean", "keep food cold", "keep food hot", and "don't keep food in the danger zone."

In this lesson we will discuss the factors of personal hygiene and work habits with which we as individuals must be concerned if we are to maintain maximum protection of the food we prepare or serve.

Since many of our customers may be carriers of a disease or be ill themselves, we want to make sure that none of their bacteria are spread to us. Therefore, we will also discuss methods that we can employ to assure ourselves of adequate self-protection.

We all want to be better salesmen because our job depends upon sales or upon satisfaction of the consumer. Therefore, we will discuss some of the personality factors and pointers that may permit you to do a better job of selling or satisfying the person you are serving.

B. Significance of Personal Hygiene in the Prevention of Foodborne Disease

Personal hygiene is a most important subject for food service employees for two reasons: first, good personal hygiene makes it possible for people to have a high level of health so that they may more effectively and efficiently perform their job; second, and most significantly, it helps in preventing the spread of disease in food establishments.

Personal hygiene is the name for a group of practices we can do every day to make us healthier, stronger, and more useful, regardless of where we work or what we do. It includes things like getting enough sleep, routinely seeing the doctor or dentist, staying away from work when sick, and avoiding poor personal habits such as picking the nose or biting fingernails and then handling food or utensils.

What is the relationship of personal hygiene and disease? How can good personal hygiene prevent the spread of disease in food establishments? We remember from an earlier lesson that the organisms causing most of the diseases that can be transmitted through food come from people like us, even though we are healthy. They also come from the mouth or body wastes of persons who are sick or who are carriers of disease. Persons who cough or sneeze on their hands, wipe their lips with their fingers, or fail to wash their hands after visiting the restroom or after handling contaminated or soiled utensils, will have disease organisms on their hands. Then, if they handle food or clean utensils, these organisms will be passed on to the food or utensils and then to the unfortunate customers. This can be prevented by making it a habit to follow the rules of good personal hygiene.

C. Rules or Practices of Personal Hygiene

There are many rules or practices of personal hygiene, but, for convenience, we can list them in three groups: practices related to personal health, cleanliness, and appearance; practices related to personal habits; and practices related to work habits.

There are two good reasons why all food service employees should follow the rules or practices of personal hygiene: first, to protect their own health; second, to protect the health of the customer. Doing so really benefits the employee a great deal in other ways, also. For example, he presents a better appearance, can be a happier person, is more popular with customers and fellow employees, and is much more likely to be considered when it comes time for increase in pay or even in getting the bigger tip from his satisfied customer.

Let us then discuss what is included in each of the three groups of rules of personal hygiene practices.

1. Rules or practices of personal health, cleanliness, and appearance.

a. Regular physical examinations.

One of the more important rules under personal health, cleanliness, and appearance is that the doctor and dentist should be visited regularly.

The need for such regular visits has been mentioned many times by health experts, and we will not discuss these reasons. It is necessary only to point out that an expert can often discover a possible health problem before we become clinically ill and cure it by some special treatment. If we do not secure medical or dental services to keep us well, we may pay the costs many times over in sickness. See your doctor and dentist regularly. Your doctor will tell you that it is good sense to get plenty of sleep and to eat a balanced diet of wholesome food.

When we suspect that we are becoming ill, or if an illness is obvious, we also should see our doctor. Food workers with colds, sore throats, dripping noses, diarrhea, or infected cuts or sores should never work where they will be directly involved in food preparation or service.[1] Remember that these are the sources of the organisms that frequently cause outbreaks of foodborne illness.

b. Personal cleanliness and appearance.

Everyone knows how important a good appearance and personal cleanliness are to persons who meet the public and who are connected in any way with the preparation and serving of food. Personal cleanliness begins with a daily bath or shower. A clean body is the foundation for all the other factors that make for a good appearance. Other important considerations are cleanliness of the face, hair, and hands.

Men should always be clean shaven and their hair should always be trimmed and neatly combed. Women, of course, should have their hair clean and neatly arranged. Men should wear caps and women should wear hair nets or use other effective restraints to prevent hair from falling into food. A waitress leaves a better impression with customers if she uses makeup sparingly. Nail polish, although not itself harmful, may deter the wearer from keeping her nails short and well scrubbed.

c. Cleanliness of clothing.

Employees should wear special clothing while working and should keep their clothes well pressed, or ironed, and neat. It is surprising how a greasy or soiled cook's apron or uniform can affect the customer's opinion of your establishment. Even one missing button or a loose zipper can spoil the appearance of an otherwise perfect uniform.

2. Relationship of appearance and health.

You may think that these rules are overly concerned with appearance and have very little to do with health. It is true that they are concerned with appearance, but appearance is something with which we are all concerned. However, they are also directly related to health because it has been found that people's actions are affected a great deal by how they feel. Thus, a person who is strong, healthy, clean, and is wearing a spotless uniform is naturally more likely to handle food and utensils in a clean manner than is an individual who has little regard for his personal cleanliness or appearance.

It is a good bet that a clean person has clean habits. Therefore, the rules we have talked about so far do concern health as well as appearance. Another point is that appearance is a big factor in creating the "atmosphere" of a restaurant. Customers are able to enjoy their meal more in an atmosphere of cleanliness and neatness than in one of dirt and disorder. This atmosphere starts with the personnel who work in the establishment.

D. Rules or Practices of Personal Habits

We all know how easy it is to form habits. Each of us has many habits, and we follow them every day. It is easy to form a habit but very difficult to break one. In this part of our discussion we are interested in learning about the habits that we should break and about those habits of personal hygiene that will permit us to improve our health as individuals and help prevent the spread of disease. We might call them personal habits or "sanitary manners."

---

[1] Army Regulation 40-5 requires a supervisor's daily inspection as follows: Mess Sergeants and immediate supervisors of food service activities will inspect all personnel daily at the start of the work period. Persons who exhibit signs of illness, skin disease, infected cuts, or boils will be referred to the Surgeon who will make a recommendation as to their fitness for duty.

Air Force Manual 161-6 indicates that supervisory food service personnel will daily or, if necessary, more frequently examine all personnel and take appropriate action to assure cleanliness and absence of open wounds and obvious infections.

1. Personal habits to avoid.

We all know that it is impolite to sneeze or cough in someone's face. This is not only bad manners; it is also very insanitary. The reason, of course, is that the disease organism of any of the many respiratory diseases may be in the droplets of spray thrown out by coughing or sneezing. These droplets may fall on food in the vicinity, and they also serve to pass infection directly from one person to another. We know that it is better to cover a cough or sneeze; however, it is not good "sanitary manners" to cover with the hand because the germs that are coughed onto the hand might easily be transferred to food or utensils. Therefore, good "sanitary manners" require the use of a clean handkerchief. Handwashing is in order after coughing or sneezing into the hands or a handkerchief.

For the same reason, it is bad "sanitary manners" to scratch the head, pick the nose, wipe the mouth with the fingers, or wet the thumb with saliva to pick up a paper napkin or to turn the pages of an order pad. Remember that germs are everywhere, and we do not want to contaminate the food in any way.

The Surgeon General of the U.S. Public Health Service has told us all that smoking may be dangerous to health, and all packages of cigarettes now carry such a warning. Smoking cigarettes is not the only way in which they may be dangerous to health, especially in a food establishment. Remember that we said that saliva from our mouths contains disease organisms. When we smoke, we touch the tip of the cigarette that has been in our mouth, thereby contaminating our hands with saliva. Also, should we lay a cigarette down on work surfaces, that surface then becomes contaminated with saliva. So remember, if we must smoke, it should be done only in areas designated for this purpose and not in food preparation areas, and never when we are preparing or serving food. Of course, we must wash our hands after we have finished smoking and before returning to work.

2. Personal habits to remember.

A most important rule or habit of personal hygiene is to keep the hands clean, so that as far as possible our own personal organisms and those picked up on our hands from other sources are washed away and, thereby, are kept out of other people's food.

We use our hands continuously in preparing and serving food and in handling utensils and equipment. Hands become contaminated in many, many ways, thereby transferring contamination to food and utensils and on to the customer. Therefore, we can see that we must wash our hands often and keep them scrupulously clean.

Our hands must be washed before beginning work, after each visit to the toilet, after handling soiled or contaminated equipment or utensils, after smoking, and before preparing food.

To encourage frequent hand washing before and during the preparation and serving of food—and incidentally before eating food—there should be sufficient and convenient handwashing basins in the kitchen and work areas as well as in or immediately adjacent to the restrooms.

Sinks for washing dishes or for the preparation of vegetables are not handwashing basins and should not be used as such. Organisms washed off the hands can contaminate the sink and then later can be transferred to the vegetables or to the utensils or equipment cleaned in the sinks.

The skin is a good carrier of microorganisms which are hard to remove even by washing. The hands should be washed thoroughly with plenty of soap and warm water when they have become contaminated and not given just a superficial rinsing. Only single-service paper or cloth towels, continuous roll towels, or a mechanical hand dryer should be used for hand drying. Make sure that a supply of clean towels is always available and that the roll hasn't come to its end.

E. Rules for Working Habits

Our third group of rules deals with working habits, which are special habits that should be developed by food service employees. They differ very little from what we have called personal habits.

1. Rules for handling clean utensils and equipment.

Consider, for example, how silverware may be handled. Many people pick up a knife by the blade, a spoon by the bowl, or a fork by the tines. It is easy to see how this practice may transfer disease organisms from the hands to that portion of the silverware that the customer puts into his mouth. Is this really any different from sticking your finger into the customer's mouth? I do not believe that it is. It is much better and just as easy to pick up silverware by the handle; then, if it becomes contaminated, the contamination is not so likely to reach the diner's mouth. The same thing is true of cups, glasses, or plates. They should be picked up by the handle, the bottom, or the edge and never be handled by the area that the customer will place in his mouth or that will come into contact with the food he eats.

Whenever possible, food should be handled with tongs, spoons, or forks rather than by the hands. Of course, some foods must be touched, and, in this case, thorough hand washing prior to handling is doubly important.

2. Rules for handling soiled utensils and equipment.

Great care should be taken in bussing tables and in handling soiled napkins, glasses, cups, silverware, and other utensils. They may carry disease organisms from customers. Employees who handle these soiled articles carelessly can pick up the germs on their hands and transfer them to their own mouths, to other customers by recontaminating clean utensils and equipment, or to food that will be served to the customer. For their own protection and for the customer's protection, employees should handle dirty utensils and equipment in the same careful way that clean utensils must be handled.

Many of us do so much as a matter of habit that it is hard to see how we could avoid doing them. We can, however, break any habit if we are determined and try hard enough. It is easy to see how necessary it is to break bad habits and develop new ones when we realize how easily disease organisms may be transmitted from place to place by the little habits we practice so unconsciously.

By knowing the good practices of personal hygiene and the reasons for them, it should not be difficult to follow these simple and very important rules of sanitary food handling.

F. Personality Factors and Salesmanship

In a food service establishment, the sales people, waiters, waitresses, counter men, and the establishment's good food are the most valuable assets. The people behind the scene—such as the cook, the dishwasher, and the maintenance men—support the people out in front and, therefore, are also an important part of the sales force.

Time spent in making food salesmen more proficient in their tasks is bound to be profitable. Customers are quick to notice the difference between courteous service by well-trained personnel and haphazard treatment from a poorly trained staff. The difference can quickly be seen in the pocketbooks of both the employees and the managers or owners.

The aim of all who work in the establishment should be to learn the basic information necessary to selling, the most effective food serving techniques, and respect for a job well done: These inspire everyone to greater productivity.

1. Food service is more than providing food.

   a. Providing service and satisfaction.

   The establishment in which you work provides a great deal more than food. You provide, along with the food, a service for which the consumer is paying. If the consumer or patron is to be completely satisfied, he has to also be satisfied with the service he receives.

   b. Selling esteem.

   You are also selling esteem, or the value that the patron places upon eating in your establishment. Does he regard your restaurant highly enough to return or to recommend it to his friends? It is the repeat patron and the word of mouth advertisement that really count at the cash register and ultimately in your pay check.

2. Traits for improving consumer relationship.

What are some of the factors that we can use to make sure that the patrons are satisfied with the service and will hold the establishment in such esteem that they will return later and also will tell their friends about the wonderful place they found to dine?

Of course, the quality of the food served plays a significant role in prompting patrons to return to your establishment. However, the manner and efficiency with which that food is served also play a significant role.

Patrons like to be waited upon and have their wants attended to. Therefore, many of the personality traits we use every day in our association with our friends will assist us in better salesmanship.

   a. Courtesy to patrons.

   Courtesy is probably one of the most important considerations in salesmanship. You might say that this is no more than the Golden Rule: "Do unto others as you would have them do unto you". No one likes to be treated with disrespect. Even though there may be occasions when it is difficult to respect someone, if we do, we are the better person for having done so.

b. Cheerful attitude.

Cheerfulness in our attitude toward the patron, toward our job, and toward our coworkers make for a much more pleasant place in which to work. A cheerful smile does wonders for those who are unsmiling, and it is just as easy to smile as it is to frown. Also, the diner may go away remembering you as the bright spot in his entire day.

c. Promptness.

No one likes to wait to be served; therefore, promptness, as the occasion may warrant, in seating and in taking orders assists in promoting better salesmanship and increased business.

d. Attention to wants and needs of the diner.

Patrons are quick to note how alert you are in satisfying their wants and needs. Being alert to keeping their water glasses filled, bringing a second cup of coffee, or serving an extra pat of butter are important points to customers. Good service makes a favorable impression that is not likely to be forgotten when it comes time to consider a tip or another visit to your establishment later.

e. Efficiency.

Being efficient in the way we do our job not only makes it possible to serve more patrons, but permits us to do it better. Diners are quick to note the efficiency with which they are waited upon. Efficiency is also something the owner or manager does not overlook when it comes time for promotions or pay raises.

f. Willingness to assist fellow employees.

Being quick and willing to assist coworkers when the need arises will win you their admiration and appreciation, and there may be a time when you may need a little extra help in waiting on those you are serving.

3. Results of attention to the patron's wants.

What are likely to be the results of applying these factors of good consumer relationship?

a. Patron satisfaction.

A satisfied patron is one who likes to visit your establishment and tell his friends about it. By applying good salesmanship, we can be assured of greater respect and more new business, which will result in a more successful enterprise for the owner, and in better tips and salaries for yourself.

b. Good management and employee relationship.

Both the employer or manager of the establishment and the food service employee are working for the same goal: increased income. Therefore, if the employee can more readily fulfill the requirements of the job, both are working towards that goal.

4. Employee traits that lead to better business.

Traits that an employee should have and that will lead to a more successful business are the same factors we have listed under the needs and wants of the customer. We remember that we said the food service employee was the most important person in the food and beverage service industry, and he is. However, he must have loyalty and respect for the employer if there is to be a successful business.

a. Interest and initiative in doing a good job.

Employees must have interest in doing the best job they know how, be willing to learn more about the job, and carry out the responsibilities of the job as efficiently as possible. They must have the initiative to do a little more than just the assigned responsibility. They must be willing to cooperate with others in their work and to help when they are needed.

b. Respect and loyalty for the employer.

Good employees show respect for their employer and are honest in their dealing with the public and with their employer. Being dependable is vital so that others will know that, when responsibility has been assigned to us, the assignment will be completed.

G. Summary

In this lesson we have seen that personal hygiene is a most important factor in the prevention of foodborne illness. We have discussed the importance of good personal health, cleanliness, and appearance, and how essential it is to develop good personal and work habits. We have seen that there are two very good reasons why all persons working with food should follow the rules of personal hygiene: first, to protect their own health and, second, to protect the health of the customer. We have also discussed many of the factors of salesmanship that should permit us to do a better job. Knowing these, and knowing the rules of personal hygiene and the reasons for them, it should not be hard to follow these simple and very important rules.

In our next lesson, we will be discussing the proper methods of washing and sanitizing utensils and equipment. In that discussion, we will see that each person in the establishment plays a role in this most important part of the operation of a food establishment.

Questions for Use With Lesson 4

PERSONAL HYGIENE, SELF-PROTECTION, AND SALESMANSHIP

True	*False*		
☐	☐	1.	Personal hygiene plays an important role in helping to prevent the spread of disease through food.
☐	☐	2.	Smoking should not be permitted while preparing or serving food because the Surgeon General has said that smoking is dangerous to health.
☐	☐	3.	The bacteria or viruses of many of the respiratory diseases may be spread in the droplet spray thrown out from the nose or mouth during a cough or sneeze.
☐	☐	4.	The location of a handwashing basin is an important factor in the frequency with which food service employees wash their hands.
☐	☐	5.	To permit faster service during rush hours, it is permissible to use the hands rather than utensils such as forks or tongs to handle food.
☐	☐	6.	Interest on the part of the food service employees in doing a good job plays a very small role in the success of the food service operation as a business.
☐	☐	7.	Courtesy is probably one of the most important considerations in customer relationship.
☐	☐	8.	It is important that a food service worker's hands be clean whenever it is necessary to handle food.
☐	☐	9.	The skin is a good carrier of bacteria.
☐	☐	10.	A conscientious food service worker will wash his hands frequently while preparing or serving food and when handling dishes, utensils, or equipment.
☐	☐	11.	One reason why a food service worker should practice good personal hygiene is for self-protection.
☐	☐	12.	There is very little connection between personal hygiene and the spread of disease through food.
☐	☐	13.	Factors of personality have very little effect upon the impression a food service worker leaves with the patron they serve.
☐	☐	14.	Many of the disease organisms that are transmitted through food come from the mouth or body waste of persons who are sick or who are carriers of a disease.
☐	☐	15.	Many of the outbreaks of foodborne illness can be prevented by changing the work habits of food service workers.

Lesson Five

Proper Methods for Washing and Sanitizing Utensils and Equipment

Page
Lesson Plan 58
Lesson Manuscript 59
  Principles to be Taught 59
  Introduction 59
  Significance of Effective Dishwashing 59
  Importance of Employee's Role 60
  Basic Methods for Washing and Sanitizing Utensils and Equipment 60
  Manual Dishwashing 60
  Mechanical Dishwashing 62
  Automatic Detergent Dispensers and Concentration Indicators . . . 67
  Cleaning and Sanitizing Large and Bulky Utensils and Equipment . . 68
  Requirements for Good Mechanical Dishwashing 69
  The Role of Single-Service Articles 69
  Summary 70
Questions 70

2

Lesson Plan No. 5

Principles to be Taught

Role of utensils and equipment in the transmission of diseases

Importance of each employee's role in the dishwashing operation

Proper methods for washing and sanitizing utensils and equipment

A. Introduction

B. Significance of Effective Dishwashing

1. Health Aspects.
2. Economic Aspects.
3. Sanitizing vs. Sterilization.

C. Importance of Employee's Role

D. Basic Methods for Washing and Sanitizing Utensils and Equipment

E. Manual Dishwashing

1. Basic steps in washing and sanitizing utensils tableware, and equipment.
2. Methods for sanitizing utensils, tableware, and equipment.
    a. The hot water method.
    b. The chemical method.
        (1) Immersion time.
        (2) Solution or water temperature.
        (3) Concentration of active ingredients.
        (4) Other chemical sanitizing agents.
        (5) Preparing and testing chemical sanitizing solutions.
3. Storage of cleaned and sanitized utensils, tableware, and equipment.

F. Mechanical Dishwashing

1. Preparation of utensils for washing.
    a. Scraping.
    b. Prewashing.
    c. Racking.
    d. Dishwashing and sanitizing.
    e. Types of dishwashing machines.
        (1) Single-tank dishwashing machines.
            (a) Role of booster heaters in dishwashing.
            (b) Cleaning of dishwashing machines.
        (2) Double-tank dishwashing machines.
        (3) Flight-type dishwashing machines.

G. Automatic Detergent Dispensers and Concentration Indicators

1. Types of detergent dispensers.
    a. Hydraulic dispensers.
    b. Electronic dispensers.
2. Detergent concentration indicators.

H. Cleaning and Sanitizing Large and Bulky Utensils and Equipment

I. Requirements for Good Mechanical Dishwashing

1. A good dishwashing machine.
2. Prewashing of soiled utensils and tableware.
3. Adequate hot water.
4. Constant supply of good, balanced detergent.
5. Proper racking of tableware and utensils.
6. Skillful and conscientious dish machine operator.

J. The Role of Single-Service Articles

K. Summary

Lesson Manuscript No. 5

Principles to be Taught

Role of utensils and equipment in the transmission of diseases

Importance of each employee's role in the dishwashing operation

Proper methods for washing and sanitizing of utensils and equipment

A. Introduction

In our last lesson, we discussed the importance of the individual food service worker observing good personal hygiene habits or practices and how they can prevent the spread of disease through food. We explored the role that all employees play in contributing to the success of the establishment as a business. We placed special emphasis on the many points that could improve the consumer relationship of those individuals who are most in contact with the public. We covered such topics as personal appearance, courtesy, promptness, and other personality traits that would help to provide better service.

During this lesson, we will study the role of the employee in dishwashing and the significance of this role. You will learn how to wash and sanitize tableware and utensils correctly, using the various methods and different types of equipment available.

B. Significance of Effective Dishwashing

1. Health Aspects.

Proper washing and sanitization of eating and cooking utensils for both health and aesthetic reasons is important. It is essential that all food service employees know and understand the reasons and basic principles involved in proper, adequate, hygienic dishwashing procedures.

It is perhaps unfortunate that the epidemiological importance of proper dishwashing has never been conclusively proven. Identifying improper dishwashing as the cause of food poisoning outbreaks is extremely difficult, but who wants to eat on unclean dishes or with soiled flatware. It is possible, however, and it has been demonstrated many times, that disease organisms of various kinds may be found on utensils that have been inadequately sanitized. Examples of these organisms are *Borellia vincentii* (the bacteria that causes trench mouth), the viruses of mumps and influenza, various types of staphylococci, including those that are antibiotic resistant, and many others. Also, *Escherichia coli* and other members of the coliform group of intestinal bacteria may be found on improperly washed and sanitized utensils and equipment. With this evidence, plus our common sense, we can readily understand why proper dishwashing is important from a health standpoint as well as an aesthetic standpoint.

2. Economic Aspects.

Sparkling clean and sanitized tableware are important from a business standpoint, and this economic aspect should not be overlooked. The psychological effect on the customer of uncleanliness often causes disgust or loss of appetite, for no one wants to eat from unclean tableware. Customers who are served food on soiled dishes or who are given soiled flatware often ask that the food or flatware be replaced. This is not only expensive, because the food may have to be discarded, but the job has to be done twice. Although a consumer may say nothing about unclean tableware that is placed before him, it may well be the cause for his not returning to dine with you later.

The serving of clean, safe food on clean tableware, which is necessary to the survival of the business, is the moral and legal responsibility of the restaurant operator. Thorough dishwashing is good business. Clean tableware for eating and drinking increases the customer's enjoyment of the meal, instills confidence in the establishment, and makes for return patronage. Tableware should complement the food, not detract from it. Foods cooked in greasy poorly washed pots or pans lose some of their fresh, distinctive flavor, and, when food is stored in soiled containers, it may absorb some of the odors or pick up "off" flavors.

3. Sanitizing vs. Sterilization.

Not too many years ago, and even today, a common term used in connection with sanitizing utensils is "sterilization." This is an incorrect term because tableware or utensils are rarely "sterilized," which means complete destruction of all living organisms. In routine practice, complete sterilization of utensils is seldom achieved, nor is it usually needed. Current dishwashing procedures and techniques, if carried out correctly, do result in sanitization of eating and drinking utensils. Sanitization is the removal or destruction of *all disease-producing organisms* from eating and drinking utensils. Special precautions, even to complete sterilization, may have to be taken for tableware used by patients with communicable diseases in hospitals, other institutions, or the home.

C. Importance of Employee's Role

Regardless of the design of dishwashing equipment and its stated efficiency of operation, dishwashing is only as effective as the person doing the dishwashing. Only when that person has properly prepared utensils and tableware for the washing process, has properly operated the dishwashing machine, or has followed the correct procedures in hand dishwashing can we be assured of clean utensils. That person's responsibility does not stop at this point. He must also see to it that cleaned and sanitized utensils and tableware are stacked and stored correctly so they will not be recontaminated.

D. Basic Methods for Washing and Sanitizing Utensils and Equipment

There are two basic methods for washing and sanitizing utensils and equipment. The first is known as manual dishwashing because the actual washing and sanitizing is done by hand. The second is mechanical dishwashing because the actual washing and sanitizing is done by machine. The end result of each method is the same sparkling clean and sanitized equipment and utensils. Regardless of the method employed or the type of equipment used, to accomplish this end requires a person who will conscientiously use the correct procedures, use the equipment in the correct way, see that proper temperatures are maintained, and maintain the equipment in proper operating condition. In other words, the operator, the employee, is the key to effective dishwashing.

E. Manual Dishwashing

1. Basic steps in washing and sanitizing utensils, tableware and equipment.

Manual dishwashing involves certain prescribed and important procedures. The steps employed are similar to those that will be discussed in more detail under machine dishwashing. First, the utensils must be scraped to free them of gross garbage and food residues. Next, they are washed in a detergent solution as hot as the hands can stand (usually 110° to 125°F) in the first compartment of a three-compartment sink until all visible food particles and grease have been removed. From the first compartment, the utensils and tableware (including glasses, cups, trays, and silverware) are passed to the second compartment which contains clear, warm rinse water. Here the soapy water that clings to them from the washing process is rinsed off. The third compartment is provided for sanitization of the utensils and tableware.

2. Methods for sanitizing utensils, tableware, and equipment.

a. The hot water method.

The hot water method is just what its name implies. Utensils are completely immersed in hot water maintained at a temperature of at least 170°F for not less than 30 seconds.[1] The 170°F is not to be guessed at. A thermometer must be used to assure that this temperature is maintained.

Water at this temperature is much too hot for a person to put his hand in. Therefore, a dishbasket, a dish rack, flatware container, or other container with a handle must be used to contain the dishes while immersing them in the sanitizing water. This permits easy removal of the utensils from the sanitizing compartment for drying.

Maintaining water in a dishwashing sink at a temperature of 170°F poses a number of problems for the owner or manager. First, as will be discussed later, the water in hot water heating systems is usually no hotter than 140°F. This means that it must be "booster-heated" to raise it to the desired 170°F. A number of other methods can be used for this purpose but they all have their limitations. A properly installed electric immersion heater in the third compartment of the dishwashing sink is one of the better methods. Gas burners under the third compartment have been used, but may be a fire and safety hazard. In any case, it is not a simple problem, and the method employed should be discussed with and approved by the Health Department before the auxiliary heating equipment is installed.

---

[1] Army Regulation 40-5 requires a temperature of 180°F.

Manual of Naval Preventive Medicine requires a temperature of 180°F for 1 minute or 170°F for 2 minutes.

Air Force Manual 161-6 requires a temperature of 180°F for 1 minute or more.

b. The chemical method.

Chemical compounds as sanitizing agents have gained widespread use throughout the industry. Numerous brand name products are on the market; however, the active ingredient, or the material in the compound that actually does the sanitizing is our principle concern. Only a limited number of chemicals are acceptable as active ingredients. Two of the more acceptable chemicals used for sanitizing agents are chlorine and iodine.[2]

Three factors that require rigid control during the use of the chemical method of sanitizing are:

(1) Immersion time.

The period of time required for immersion of the utensils or equipment in the sanitizing solution is important for effective sanitization. This period is for a minimum of 1 minute [3] for the chemical method instead of 30 seconds when using the hot water method.

As you can see, this requirement does not permit the person washing utensils or tableware to dip them into the sanitizing solution and immediately remove them for drying or rinsing. The practice of just dipping tableware, especially glasses, frequently occurs in manual dishwashing operations. This practice is incorrect and must not be permitted. So remember, the procedures for dishwashing are exact and are not to be altered if we are to have clean, sparkling, and sanitized equipment and utensils.

(2) Solution or water temperature.

The temperature of the sanitizing solution or water is the second important factor. Chemicals react differently at different temperatures. Therefore, to be assured that they will react the same each time, the temperature at which the solution is to be maintained must be specified. The most practical temperature for maintaining the solution and obtaining effective kill of organisms remaining on the utensils has been established at a minimum of 75°F.

(3) Concentration of active ingredients.

The third factor to remember when using chemicals for sanitizing is the concentration of the active ingredient being used. This will vary with different chemicals and must be rigidly controlled if effective sanitization is to be accomplished.

When using chlorine, the minimum concentration, or least amount of available chlorine permitted, is 50 parts per million.

When using iodine, the minimum amount is 12.5 parts per million. In addition, the water must be controlled at a level not higher than 5.0 pH as a measure of the acidity of the solution being used. Although this aspect of using iodine is important and must also be rigidly controlled, we will not discuss it here, but simply say that, before using chemicals for sanitizing solutions, you should check with your health agency to make sure the chemicals will be effective in the water you will be using.

(4) Other chemical sanitizing agents.

Other chemical sanitizing agents also will do an effective job of sanitizing utensils and tableware. If you plan to use these, they must be as effective as the chlorine solutions described above and must be approved by the health officer.

(5) Preparing and testing chemical sanitizing solutions.

When preparing fresh solutions of chemical sanitizers, it is recommended that the concentration or strength be double the minimum requirement. Therefore, chlorine solutions would have a strength of 100 parts per million, while iodine solutions would have a strength of 25 parts per million.[4]

There is a very logical reason for this double strength. Remember that the minimum concentration has been established as the lowest or smallest amount of chemical that can be used and still give an effective kill of the organisms present on the utensils. As dishwashing proceeds, water is carried over from the rinse compartment, thereby diluting or making weaker the sanitizing solution. Also, part of the active ingredient is used during the sanitizing process, further lowering the concentration. To overcome these two factors and maintain an effective sanitizing solution, we make our fresh solutions double strength. When the concentration of the used solution falls below the minimum established for the particular chemical being used, the solution is discarded and a fresh one prepared.[5] Instructions for preparing fresh solutions at the proper concentration are usually given on the container in which the chemical is shipped. Follow these instructions carefully, and consult your health department if you have specific questions regarding the chemical you are using.

---

[2] Chlorine, food service (FSN 6840-270-8712), should be used according to instructions on the package. For automatic cold water glasswashers, an iodophor detergent sanitizer, evaluated and certified by the National Sanitation Foundation Testing Laboratory, Inc., Ann Arbor, Michigan, or other recognized agencies with equivalent testing programs, will be used.

[3] Air Force Manual 161-6 requires immersion in chlorine for not less than 2 minutes.

[4] In the Navy, fresh chlorine solutions will have a strength of 200 ppm. In the Air Force, chemical solutions must contain the equivalent of 200 ppm free available chlorine.

To check on the concentration or strength of the sanitizing solution, it is necessary that an appropriate test kit be available for frequent use. These are usually provided free by the person or firm furnishing the sanitizer. If you are the person responsible for dishwashing, make sure that you know how to use the kit and that it is maintained in proper working condition.

Remember, also, that when the wash, rinse, or sanitizing solution becomes soiled or cloudy, you must discard the old solution and begin with a fresh one in each compartment as needed. ed. This applies to whatever method, whether hot water or chemical, that you may be using. In this way you will assure your customers of clean sparkling utensils and tableware.

3. Storage of cleaned and sanitized utensils, tableware, and equipment.

No matter what procedure is used for washing utensils, they should always be air dried. No towels of any kind should be used. Towels quickly become contaminated from any soil that may be left on utensils or that may have been picked up elsewhere, and such contamination is quickly spread to those utensils or tableware that are dried by towel later. Actually, after utensils are immersed in water of 170°F, or more, they air dry very quickly. There are a number of rinse additives available that will aid materially in preventing water spotting. Thus, there is no necessity for drying with a towel.

Food-contact surfaces of all cleaned and sanitized equipment and utensils must be handled in a manner that will protect them from contamination. Cleaned spoons, knives, and forks should be picked up and touched only by their handles. Clean cups, glasses and bowls should be handled so that fingers and thumbs do not contact inside surfaces or lip-contact surfaces.

Portable equipment and utensils must be stored above the floor in a clean dry location. Suitable space and facilities, such as shelves, cabinets, or movable carts, should be provided so that all food-contact surfaces are protected from splash, dust, and other contamination.

Food-contact surfaces of fixed equipment, such as slicers, mixers, or grinders, should be protected from splash, dust, and other contamination. Utensils, too, should be air dried before being stored or should be stored in a self-draining position on hooks, or racks. Whenever practicable, stored containers and utensils should be covered or inverted.

F. *Mechanical Dishwashing*

The use of mechanical dishwashing in food service operations has grown tremendously in recent years. Owners and operators of food service establishments have learned that mechanical dishwashing is effective and faster, and that it takes less personnel to do the job. Also, the design and construction of dish machines has improved, and they have become much more generally available.

The entire subject of design, construction, and performance of mechanical dishwashing machines has been studied extensively. The studies made by the National Sanitation Foundation Testing Laboratory, a nonprofit corporation located at the School of Public Health, University of Michigan, Ann Arbor, Michigan, are the most comprehensive. Their studies resulted in the publication of NSF Standard No. 3. which deals with "Spray Type Dishwashing Machines." It was first published in May 1953 and has since been revised to keep abreast of improvements in the design of dishwashing machines. The standard establishes design, construction, and performance specifications for various types and sizes of spray type dishwashers. When purchasing a new machine a person should make sure that the machine meets the criteria of the standard. In this way, the owner can be better assured that the equipment, when installed and operated correctly, will do an effective job of washing and sanitizing utensils and tableware.

There are many types of designs of mechanical dishwashing machines, but all of them require the same basic and relatively distinct steps discussed under manual dishwashing and used in any dishwashing process if that process is to be effective. These steps are scraping, prewashing, racking, washing (in machine), rinsing, sanitizing, airdrying, and clean storage of the utensils until the next use.

---

[5] In the Army, fresh chlorine solutions will be made for rinsing and sanitizing utensils for each 100 persons. Also, see TBQM39 for information on standard stain removing compounds.

1. Preparation of utensils for washing.

a. Scraping.

The purpose of scraping is obvious—to remove the garbage, gross food particles, and the bulk of the visible soil from the dishes, thereby avoiding unnecessary fouling of the wash water in the steps that follow.

Scraping is usually into a clean garbage can through a hole in the soiled dish return area. A rubber collar is usually placed in the hole to prevent cracking and chipping of the dishes during scraping. Scraping is also frequently accomplished by flushing the larger food particles into a garbage disposal unit. Actually, when scraping is accomplished in this way, you might say that it is a part of the prewashing step.

b. Prewashing.

Prewashing accomplishes several important purposes. The main purpose of prewashing is to lessen the organic load on the dishwashing machine, thereby minimizing the work that the machine has to do. No mechanical dishwashing machine can accomplish miracles. Therefore, it is important to give the machine any assistance possible to improve its operation. Prewashing also removes a large portion of the gross soil and grease that remains from the scraping operation. In addition, it is economical in that it saves a considerable amount of detergent that must be maintained in the dishwashing machine. It allows for presoaking of tableware to remove stubborn food soil, such as egg protein and other sticky types of food that tend to dry and cling to the tines of forks and on the surfaces of dishes.

Prewashing may be done satisfactorily in a number of ways. The most common method in use today is an overhead spray head or nozzle that directs a clean water spray over racks of tableware. The rack is placed over a shallow sink in the soiled dish side of the dishwashing set-up and warm water is then directed over the tableware to remove the soil and grease. The water then drains to the sewer. Clean water is used to prewash the tableware by this method.

A commercial prewashing device also is commonly used. This is a machine that has a pump to recirculate the wash water from a holding tank into an arc over an opening in the top of the machine. Dishes are held, one by one, under the water to be washed. The water and the food thus removed drops back into the hopper where the garbage is strained out by a basket or screen and the water is recirculated. Fresh make-up water is continuously added, but the dishes are always washed in soiled water. In this method, the dishes are racked after prewashing. In the spray method, they are usually racked before being prewashed.

Wood and metal have long been used in the construction of racks for holding tableware. Today, plastic coated metal or all plastic or nylon racks are usually supplied with new machines and are to be preferred over the wooden or metal racks. Racks should be constructed to make it possible for sprays to reach all parts of all tableware, to discourage crowding of tableware in the rack, and to allow easy and proper positioning of the racks in the machine.

One type of rack is intended for flat tableware, such as plates, saucers, and trays. This rack has horizontal dividers to separate the utensils from each other and hold them in a near-vertical position. The other type of rack is used to hold flat ware, cups, bowls, glasses, pitchers, and other types of dishes that could hold water. Whatever the form, the racks are approximately 20 inches square, although half size and special size or designed racks may be ordered.

c. Racking.

Proper racking of utensils and tableware is an important part of dishwashing operations. Proper racking assures that all surfaces of utensils or tableware are exposed to the spray and the jets of water as the machine is operated. It also permits their removal from the racks after washing without touching and possibly contaminating the eating or food contact surfaces of the clean utensils. To assure that this is accomplished, racks should not be crowded. For most efficient use, dishes or utensils of approximately the same size and shape should be washed in the same rack.

In the racks for tableware, the horizontal dowel bars or rods are provided to separate the flat dishes, such as plates and saucers, so that all of them can be washed and rinsed by the sprayed jets of water impinging upon them from above and from below in the dishwashing machine. The emphasis here is on the word "separate." If the utensils are not separated, jets of water cannot reach the surfaces of all the dishes and little or no washing and rinsing of those surfaces can or will occur.

Care must also be taken in use of the rack intended for cups, bowls, glasses, and other water-holding utensils, as well as flatware. All water-holding tableware, such as cups and glasses, must be inverted (placed upside down) in the rack. The reason for this is obvious—if not inverted, they would quickly fill with wash water and would gain no "scrubbing" action from subsequent jets of water as they continued their stay or length of travel in the machine. By inverting them, they hold no water and thus benefit from jets of water throughout their stay in the machine. They must be placed in the rack no more than one layer deep in order for the jets of water to have free access to all surfaces of each utensil. Much the same thing is true of flatware, which should be placed in the rack no more than one layer deep. Deep layers result in poor washing, cause rewashing, and increase the possibility that customers will be given soiled flatware.

Flatware also may be washed by being placed in perforated containers, such as those used to store and dispense flatware, and then run through the machine in racks. The secret here for complete washing is to place the flatware loosely in the container with the tines of the forks, the bowls of the spoons, and blades of the knives up. When this method of washing is employed, flatware need never be touched after washing until selected by the diner or placed on the table by the waitress. By inverting the freshly washed flatware into another clean and sanitized container, the handles are in an upright position ready for dispensing directly from the container after air-drying.

d. Dishwashing and sanitizing.

After utensils have been properly racked and the racks prewashed, they are ready for insertion into the machine.

When using mechanical spray-type dishmachine, the actual washing, rinsing, and sanitization of the utensils are completed within the machine.

Several types of dishmachines suitable for specific sizes and types of establishments are available. We will discuss the operation of the major types. Regardless of the type of machine used, it must effectively remove all soil remaining from the prewashing operation and then effectively reduce the types and numbers of microorganisms to a safe level during the sanitizing operation. Since there are slightly different methods by which sanitization is accomplished in the different types of machines, we will cover the different methods as we discuss the operation of individual types of machines.

e. Types of dishwashing machines.

As we have mentioned, there are several types of dishmachines to suit the needs of individual establishments. They generally fall into two categories, commonly referred to as single-tank and multiple tank machines. Each of these can also be obtained in different models or types. Let us discuss each of these categories and some of the various types in detail so that we can better understand why proper operation of the dishmachines is so important in the operation of the entire establishment.

(1) Single-tank dishwashing machines.

Single-tank machines are intended for smaller establishments or for specialized operations in larger establishments. The two most common single-tank machines are the door type and the conveyor type.

The designation of "single tank" comes from the fact that these machines have a single tank for wash water. The tank will vary in capacity depending on the manufacturer and particular model of machine. The wash water is recirculated by the pump to spray each rack of dishes inserted into the machine.

The notation "door type" means that there are two doors that can be raised and lowered to admit racks of dishes into the machine. Usually these two doors are interlocked so that if one is raised or lowered, the other will also raise or lower. When lowered into place, the doors provide a watertight compartment in which washing can occur without splashing wash or rinse water outside the machine.

The other category of single-tank machines is the conveyor type. The operation is very similar to that of the multiple-tank machines to be discussed later, therefore, we will not go into detail about their operation at this point.

A detergent is placed in the wash tank of a single-tank machine prior to the start of the dishwashing process, and, unless detergent dispensers are provided, the tank must be replenished from time to time with detergent as dishwashing progresses. The usual rule is to add one-fourth the initial amount of detergent after each 10 racks of utensils have passed through the machine. Beyond the 10 racks, the efficiency of the original detergent solution would be questionable if detergent is not added.

Instead of solid doors, the two ends of the conveyor machine are closed with canvas or plastic curtains. Racks inserted at one end are engaged by lugs on a moving conveyor chain in the machine, and then conveyed through the machine and slowly ejected from the opposite end by this conveyor.

The minimum washing time for each rack utensils in a single-tank stationary rack dishmachine will be about 40 seconds in recirculated wash water containing detergent. This wash water must be maintained at a temperature of 140° to 160°F.[6] In order to operate the machine initially, it is necessary to fill the tank with water that has been booster-heated or wait until the tank heater raises the water to this temperature. Frequently this water is obtained from the same source that will be used later for the rinse cycle. A minimum of 92 gallons of water must be sprayed over each 20″ x 20″ rack. Racks of other sizes require a varying amount of water, and the quantities are outlined in the National Sanitation Foundation criteria for dishmachines.

Following the washing cycle, the machine is stopped either by the operator working a control handle mounted on the machine or by automatic controls. The control is changed from the wash cycle to the rinse cycle, causing clean, fresh hot water at a minimum temperature of 180°F to be brought to the machine from the booster heater and sprayed through the spray manifolds from above and below onto the rack of utensils in the machine for a period of at least 10 seconds. The machine must be equipped with an accurate thermometer, and it is recommended that a pressure gauge be installed.

Many older machines are operated by manual control, including determining the length of time for both the wash and rinse cycles; however, the latest revision of National Sanitation Foundation Standard No. 3 requires that all dishmachines be supplied with automatic timing controls for both the wash and the rinse cycles.

(a) Role of booster heaters in dishwashing.

Some further clarification of the role of the booster heater in dishwashing should be made at this point. Booster heaters are designed to increase the heat of *preheated* water. They are not designed to heat cold water. Normally, hot water heating systems for general use in the establishment are set and thermostatically controlled to produce water throughout the establishment at a temperature no higher than 120° to 140°F. It is not wise to maintain a temperature higher than 140°F, because additional heat may cause bad skin burns as people wash their hands or use the water for other purposes. Accidents can happen and, to prevent them, it is better to keep the water temperatures at most points of use at no more than 140°F. From an economical standpoint, it is better to raise the temperature of the water only as needed. Also, the life of the water heater tank is extended. Therefore, the water in the heating system must be booster heated to at least the 140° to 160°F range for recirculated wash water in any machine, to a minimum of 170°F in recirculated rinse water in a double-tank machine, and to a minimum of 180°F as a final rinse in all types of dishwashing machines. Booster heaters are supplied in many forms and are either gas-fired or electrically heated; others may utilize a heat-exchanger principle to heat water from steam used in some aspects of the cooking process in the establishment. Booster heaters are an essential part of any dishwashing process and must be provided and maintained if an effective job of dishwashing is to be accomplished.

(b) Cleaning of dishwashing machines.

Cleaning dishmachines after the dishwashing period is completed is necessary and cannot be overlooked if the machine is to be maintained properly and is to continue to do the job for which it is designed. Clearing involves emptying the wash-water tank completely, so that any garbage or grease that may have settled to the bottom may be removed and the tank cleaned. It also means removing the strainers from the tank and scrubbing them to remove grease and any trapped bits of garbage clinging to them. The spray arms should be removed, if possible, dismantled, and thoroughly cleaned inside and out. Particular attention should be given to cleaning the jet spray nozzles to make sure they are free and unclogged. Cleaning should be done after each meal, and more often if the water becomes very soiled, the jets clogged, or other conditions are noted that reduce the efficiency of the machine.

---

[6] Army regulations require a minimum of temperature of 150°F for all types of dishwashers.

(2) Double-tank dishwashing machines.

Double-tank dishwashing machines are capable of handling between 165 and 275 racks of utensils per hour, depending on the particular design, the skill of operation, the availability of hot water, and a number of other considerations. The nomenclature "double-tank" comes from the basic construction, which includes two tanks, one for recirculated wash water containing detergent, and the other for a recirculated rinse. A final "curtain rinse" at a temperature of 180°F is provided to give the dishes a clear-water sanitizing rinse immediately before emerging from the machine. The racks of utensils are conveyed at a regulated speed through the machine by a continuous conveyor chain having lugs to engage the racks.

When using a double-tank dishwashing machine, it is still necessary to proceed through all the usual and vital preliminary steps. Scraping, prewashing, soaking of flatware, possibly special washing of glasses and cups to remove stubborn stains, and proper placing of utensils and flatware in the racks cannot be omitted. It is also necessary to follow the machine dishwashing process with air-drying and storage in a clean and dust-proof area until the next meal.

As a rule, the initial amount of the proper quantity and kind of detergent is added to the wash-water tank by hand, in accordance with the manufacturer's instructions, the instructions provided with the particular kind of detergent used, and the known hardness of the water. If the machine is not supplied with a detergent dispenser, replenishment charges of detergent, (to resupply that amount lost through usage and through wastage out of the overflow to the drain) must also be added by hand. This is usually done based on practical experience: about one-half of the initial amount is added after each 20 minutes of operating or perhaps one-fourth of the initial amount is added after every 10 racks of utensils have passed through. In any event, it must be done conscientiously if the detergent concentration is to be maintained at the proper level.

Temperature of the wash water must be between 140° and 160°F, the same as for a single-tank machine.[7] This temperature is achieved initially by filling the wash-water tank directly from the booster-heated hot water system. This temperature is then maintained by overflow from the rinse-water tank, which is maintained at a minimum of 170°F. Both of these temperatures are shown by indicating thermometers permanently mounted on the machine, usually in a conspicuous location on the front of the machine to permit easy reading and a continuous check on the water temperatures.

The speed of the moving conveyor chain is regulated to allow each lineal inch of rack a travel time of at least 7 seconds inside the washing compartment of the machine and a similar time interval in the rinse compartment of the machine. Each lineal inch of conveyor (and thus, each lineal inch of each rack of utensils passing through the machine) must be sprayed from above and below with a least 1.65 gallons of pumped recirculated water.

Racks of utensils must not be pushed into the machine, nor must they be pulled from the machine before the conveyor belt actually ejects them. Any shortcuts of this sort reduce the time interval in the washing and rinsing cycles that were discussed, and render the washing and sanitizing ineffective.

As a final treatment of utensils in a double-tank machine, each lineal inch of rack is sprayed for 1 second with a minimum of 4 gallons of hot water per minute at a minimum of 180°F temperature at the proper pressure in a process known as a "curtain rinse." This is clean hot water introduced into the machine from the booster-heated supply. After it sprays the utensils, it drains into the recirculated rinse-water, thereby helping to maintain its temperature at the required 170°F. The curtain-rinsing operation is activated by the rack striking a lever as it moves along. The lever opens a valve, starting the flow of rinse water to the curtain rinse. The valve remains open only as long as the rack is actually beneath the spray.

---

[7] Army regulations require a minimum temperature of 150°F for all types of dishwashers.

After the curtain rinse process, racks of utensils are automatically ejected from the machine by the conveyor belt and are then permitted to stand for a minute or two to air dry. Drying will be very rapid because the utensils are at a temperature near 180°F. At this temperature, water should evaporate from them very quickly.

To aid in giving sparkle to clean utensils and tableware, a rinse water additive is frequently used. This is a liquid injected into the curtain rinse water, or into the rinse water cycle of other types of machines. "Rinse water additive" works by reducing the surface tension of the water, thereby aiding in a better and quicker draining of the water remaining on the utensils when they emerge from the machine. This results in a minimum of water spotting, thereby eliminating the need for hand toweling.

(3) Flight-type dishwashing machines.

These machines were developed for "big business," that is, large food establishments where large numbers of utensils are to be washed. They are manufactured in several sizes and, instead of being rated on the number of racks of utensils that they will handle per hour they are rated on the basis of the number of utensils per hour that can be processed through them with skilled operation. These ratings vary from 6,000 to 18,000 utensils per hour.

Flight-type machines are essentially multiple-tank dishwashing machines. They perform the same functions in the same order with the same specifications applying. The main difference is that, instead of utensils and tableware being conveyed through the machine in racks, the utensils and tableware are placed between vertical projecting nylon or stainless steel "fingers" attached to a continuous belt that carries them into, through, and out of the machine.

During the time they remain in the machine, each utensil is washed with recirculated wash water, rinsed with recirculated rinse water, and finally rinsed and sanitized with curtain rinse water at 180°F before being ejected from the machine. Since the conveyor belt is continuous and returns underneath the machine to be reloaded with more utensils, one or more operators must be located at the exit end of the machine to remove the utensils from the belt as it moves along and before it comes to the end of its path and passes underneath the machine for a return trip. Since the utensils are at a temperature of nearly 180°F, and this temperature is too hot for the hands, these workers may use clean asbestos gloves to protect their hands from the heat of the utensils.

G. Automatic Detergent Dispensers and Concentration Indicators

We mentioned previously that the dispensing of detergents by hand into a dishwashing machine is unreliable. This is particularly true for replenishment dosages necessary to maintain the proper concentration in the wash water.

In recognition of the problems associated with hand dispensing of detergents, research began several years ago to develop mechanized detergent feeding equipment that would do the job more accurately and more economically. Such equipment has been developed and is now generally available. Usually, it is supplied by either the detergent manufacturer or the dishmachine manufacturer. It will automatically and uniformly add the required amount of detergent to the wash water so that the optimum concentration can be maintained.

1. Types of detergent dispensers.

   a. Hydraulic dispensers.

   At present, only detergent solution feeders or dispensers have proved successful and are widely used. Two types are generally available—hydraulic and electronic—depending upon their method of operation. Both type have components in common. The first of these is a small reservoir mounted on top of the dishwashing machine or on a wall above the machine. This dispenser reservoir has water supplied to it and an overflow through which detergent solution can flow by gravity into the wash-water tank. Before starting the dishwashing process, this reservoir is filled to the overflow with water, and enough powdered detergent is added to provide an excess. The detergent in the reservoir dissolves slowly and creates a saturated detergent solution. During long dishwashing periods, the initial amount of dry detergent may have to be replenished in the reservoir more than once.

As small amounts of water are periodically introduced into the reservoir during the dishwashing process, equivalent amounts of the detergent-saturated solution in the reservoir pass out of the overflow of the reservoir and drop into the wash-water tank of the machine. This replenishes the concentration of detergent in the wash water, maintaining the optimum concentration.

The flow of water to the reservoir is managed in several different ways, depending on whether the dispenser is hydraulic or electric (or electronic). In the hydraulic type, the flow is activated by the same valve lever that is pressed by the rack passing through the machine to cause the flow of water to the curtain-rinse manifold. At the same time that water is flowing to the curtain rinse, some of it is bypassed to the dispenser reservoir. When the rack passes, thus closing the valve, the flow of water to the reservoir is cut off until the next rack passes through the machine. Thus, it can be seen that the detergent concentration in the washwater tank of the machine is replenished each time a rack of utensils passes through the machine. For efficient operation of the dispenser, the detergent solution must be kept saturated, and the amount of replenishment water coming to it must be carefully calibrated to ensure that the correct amount of detergent-saturated solution overflows from the reservoir to the wash-water tank.

b. Electronic dispensers.

In the case of the electric and electronic-type dispensers, the action is controlled by electrodes submerged in the wash-water tank. A low voltage electric current is emitted from one electrode. When the detergent in the wash water is at the proper concentration to conduct electric current, the current will flow to the other electrode, completing the circuit. This completion is electrically communicated to the control box, which measures the amount of current flowing and reacts accordingly. If everything about the system is in calibration and if insufficient current flows between the electrodes (indicating a too weak or diluted concentration of detergent), the control box sends an electric signal to a magnetically operated valve, which opens to allow the water to flow into the detergent reservoir, overflowing the reservoir and, thereby, adding detergent to the wash-water tank. When the detergent strength is sufficient to build up the conductivity of the wash-water solution to the desired concentration, the control box will signal the solenoid valve to stop any further additions of water to the reservoir until more detergent is subsequently needed in the wash water. When in good repair and in good calibration, automatic detergent dispensers are excellent devices for all types of dishwashing machines. They do, however, need routine cleaning and maintenance if they are to operate properly.

2. Detergent concentration indicators.

In the case of smaller machines, another simpler device is frequently used. This device simply indicates the concentration of the detergent in the wash tank. These indicators have electrodes submerged in the wash water, and the rate of flow of current between them is indicated in an ammeter-type device mounted on top of the dishwashing machine. The dial on the indicating device shows three colored areas, usually red, green, and white. When the detergent concentration is within optimum range, the needle rests in the white area. When the concentration drops below the optimum level, the needle points to the red area of the scale, indicating that replenishment of detergent in the tank is necessary. This has to be done manually. Enough powdered detergent is added to the tank to return the indicating needle to the white area of the scale. When too much detergent is added, the needle will swing to the green area, indicating that the detergent concentration in the wash water is greater than the optimum. When using indicators, a conscientious operator will quickly learn the proper amount of detergent to add each time replenishment is needed.

H. Cleaning and Sanitizing Large and Bulky Utensils and Equipment

Cleaning of large or bulky utensils, such as large pots and pans, requires conscientious effort on the part of employees. It is just as vital to wash and sanitize equipment properly as any other utensils used in either preparing or serving food. These sanitizing techniques are essentially the same as for other utensils.

When possible, equipment should be taken apart, scraped, and washed by machine or manually as is any other utensil. All surfaces with which food comes into contact must be washed with hot detergent water, rinsed by warm water, and finally sanitized by a final rinse of 170°F water or, if this is not possible by steam; or it can be sanitized chemically by spraying over the surface a sanitizing solution of twice the usual recommended concentration for immersion. For large installed items of equipment, this will have to be done in place.

I. Requirements for Good Mechanical Dishwashing

In the nature of a summary on the general subject of hot water and mechanical dishwashing, it can be said that there are six equally important links or elements in good mechanical dishwashing.

1. A good dishwashing machine.

The first requirement is good equipment maintained in proper operating condition. Getting a good machine in the beginning is assured if the machine meets the specifications set forth in National Sanitation Foundation Standard No. 3 for Spray-Type Dishwashing Machines. Then, it is essential that the machine be maintained properly and cleaned thoroughly after each use.

2. Prewashing of soiled utensils and tableware.

The second essential in good dishwashing is satisfactory prewashing of the utensils and tableware before they enter the machine. As previously explained, no dishwashing machine is capable of performing miracles, and we should not expect it to do so. If we ask the machine to do what it is capable of, and no more, then it will give good results.

3. Adequate hot water.

The third major essential is an adequate supply of hot water at the required temperatures. This involves good booster-heating equipment capable of heating water fast and efficiently. No dishwashing machine can clean utensils without adequate hot water.

4. Constant supply of a good, balanced detergent.[8]

The fourth essential is a constant supply of a good, balanced detergent maintained by a dispenser kept in good calibration and repair. Too little detergent in the machine contributes to ineffective grease and soil removal; too much detergent may be difficult to rinse off and, therefore, may tend to leave white spots on the utensils.

5. Proper racking of tableware and utensils.

The proper racking of utensils and tableware is the fifth essential. If utensils are placed in racks in such a way that water spray cannot reach their surfaces, they cannot be properly washed, even in the best or most expensive dishwashing machines.

6. Skillful and conscientious dishmachine operator.

The sixth essential is a skilled, conscientious operator. Poor operators can nullify the benefits from even the best machines.

Although it is not a distinct part of dishwashing, it should be emphasized that proper, safe, clean, and sanitary storage of clean utensils after they are washed is extremely important. It does not make sense to spend a great deal of money on a dishwashing machine, supply it with operating personnel, hot water, detergents, and power to operate it, and then store the clean, sanitized utensils in places where they would be unprotected from dust, flies, roaches, rats, mice, sneezing, coughing, excessive handling, and other sources of contamination.

J. The Role of Single-Service Articles

Single-service articles are just what the name implies: cups, containers, lids or closures, plates, knives, forks, spoons, straws, napkins and the like that are constructed of paper, wood, plastic, synthetic and similar materials. Although some of these articles may have the appearance of multiuse utensils, they are meant to be used one time, then are to be discarded.

Although we are all familiar with single-service materials, we probably do not realize the extent of their usage. Not only are they used in drive-in restaurants and similar establishments, but they often are used as complete tableware in hospitals and institutions. Some administrators of institutions have stated a preference, both from a cost factor and from ease of storage and service, of single-service tableware over the traditional place settings. Single-service articles also may be used when dishwashing facilities are not large enough to handle the total volume of business, or when catering to carry-out business.

Care must be taken, however, to assure that single-service articles are purchased from a reputable source to make certain that they are manufactured under sanitary conditions. They must be stored in such a manner that the surfaces will not become contaminated. Dispensers designed to speed up handling and furnish added protection against contamination are recommended.

---

[8] Army personnel should refer to TB QM 39 for information pertaining to the use of standard dishwashing compounds for use in both mechanical and hand dishwashing.

Navy personnel should refer to the Manual of Naval Preventive Medicine, NAVMED P-5010 for information regarding the types of detergent used with hard and soft water ashore and afloat.

K. Summary

In this lesson, we have presented the importance of effective equipment, utensil, and tableware washing. Only with a conscientious effort by all employees, whether manually washing utensils and equipment, operating dishwashing equipment of various types, or simply handling cleaned utensils and equipment, can the washing process be effectively accomplished. The six basic requirements presented and discussed are essential if effective washing of utensils, tableware, or equipment is to be accomplished.

Questions for Use With Lesson 5

PROPER METHODS FOR WASHING AND SANITIZING UTENSILS AND EQUIPMENT

True	***False***		
☐	☐	1.	It has been demonstrated that disease organisms may be present on utensils, tableware, or equipment that have been inadequately sanitized.
☐	☐	2.	Sparkling clean and sanitized tableware are important from a business standpoint since soiled dishes or flatware may mean a lost customer.
☐	☐	3.	Sanitization is the removal or destruction of all disease-producing organisms from eating and drinking utensils and equipment.
☐	☐	4.	Dishwashing is only as effective as the individual responsible for the dishwashing operation.
☐	☐	5.	Cleaner utensils may be obtained by using the mechanical dishwashing method as compared with the handwashing method.
☐	☐	6.	In the manual method of washing utensils, the prerinsing step comes before the scraping of the utensils.
☐	☐	7.	In the manual dishwashing method, the clean water rinse comes after the utensils have been sanitized.
☐	☐	8.	When using the hot water method for sanitization in a manual dishwashing operation, the temperature of the water must be at least 170°F.
☐	☐	9.	The minimum length of time necessary for immersion of utensils when using the hot water method of santization is 30 seconds.
☐	☐	10.	When using the chemical method for sanitization, the minimum time necessary for immersion of the utensils or tableware is 45 seconds.
☐	☐	11.	Since chemicals used for sanitization react differently at different temperatures, it is important that the water temperature of chemical sanitizing solution be maintained at not less than 75°F.
☐	☐	12.	When using chlorine as a sanitizing chemical, the sanitizing solution should contain not less than 50 parts per million.
☐	☐	13.	When preparing chemical sanitizing solutions, the amount of chemical in the freshly prepared solution should be double the minimum amount required.
☐	☐	14.	It is necessary to use a towel to dry utensils so they will not have water spots.
☐	☐	15.	The owner or operator of a food service establishment can be assured of having sparkling clean utensils if he has installed the latest in mechanical dishwashing equipment.

True	False		
☐	☐	16.	The primary purpose of prewashing utensils in a dishwashing operation is to lessen the load on the dishwashing machine.
☐	☐	17.	The manner in which utensils or tableware are placed in a rack for washing has very little effect on how well they are washed.
☐	☐	18.	Maintaining the correct amount of detergent in a dishwashing machine may be easily accomplished by placing a few hand fulls of the detergent in the wash tank of the machine every 20 minutes.
☐	☐	19.	The wash water temperature in a dishwashing machine must be maintained between 140° and 160°F.
☐	☐	20.	The minimum temperature of the rinse water in a mechanical dishwasher is 180°F measured at the entrance of the manifold.
☐	☐	21.	The role of the booster heater in the dishwashing operation is to increase the temperature of the water in the hot water distribution system to the temperature required by the dishwasher.
☐	☐	22.	In mechanical dishwashing operations having a prewash step, there is very little need to clean the dishmachine more than once a day.
☐	☐	23.	A rinse water additive increases the temperature of the rinse water.
☐	☐	24.	Automatic detergent dispensers are used primarily to economize on the cost of detergents.
☐	☐	25.	There are a number of equally important elements in a dishwashing operation. Among them are adequate hot water, skillful and conscientious person doing the dishwashing, and a constant supply of a balanced detergent.

Lesson Six

Insect and Rodent Control

Page

Lesson Plan 74

Lesson Manuscript 75

  Principles to be Taught 75

  Introduction 75

  Relationship of Insects and Rodents to the Spread of Disease 75

  Basic Elements of an Insect and Rodent Control Program 75

  Housefly: Description, Habits, and Control 76

  Cockroaches: Description, Habits, and Control 77

  Rats: Description, Habits, and Control 78

  Other Insects 80

  Safety Guidelines for the Use of Pesticides 80

  Summary 81

Questions 81

Lesson Plan No. 6

Principles to be Taught

The role of insects and rodents in the spread of disease

Methods for the control of insects and rodents

The role of employees in the proper control of insects and rodents

The proper use and control of pesticides

A. Introduction

B. Relationship of Insects and Rodents to the Spread of Disease

1. Interest in all insects and rodents.
2. Main interest and problem: rats, houseflies, and cockroaches.

C. Basic Elements of Insect and Rodent Control Program

1. Basic environmental sanitation.
2. Effective chemical control of pests.

D. Housefly: Description, Habits, and Control

1. Description and habits.
2. Life cycle and control measures.
   a. Life cycle.
   b. Control measures.

E. Cockroaches: Description, Habits, and Control

1. Description and habits.
2. Life cycle and control measures.
   a. Life cycle.
   b. Control measures.

F. Rats: Description, Habits, and Control

1. Description and habits.
2. Life cycle and control measures.
   a. Life cycle.
   b. Control measures.

G. Other Insects

H. Safety Guidelines for the Use of Pesticides

I. Summary

Lesson Manuscript No. 6

Principles to be Taught

The role of insects and rodents in the spread of disease

Methods for the control of insects and rodents

The role of employees in the proper control in insects and rodents

The proper use and control of pesticides

A. Introduction

In our last lesson, we learned about the proper method for washing and sanitizing utensils and equipment. We learned that each employee has a significant role to play in this most important operation of the food establishment. We found that disease organisms can be spread to customers and to ourselves by utensils and equipment that have not been properly washed and sanitized. We learned also that, although there are different methods and types of equipment that may be used for washing and sanitizing dishes, utensils, and equipment, one of the most essential parts of the entire dishwashing operation is a skillful and conscientious employee to do the job. We learned further that, once equipment and utensils have been properly cleaned and sanitized, they must be correctly stored and handled to avoid recontamination.

In our lesson today, we will be discussing the role that insects and rodents play in the spread of disease organisms and filth. We will also discuss the methods that we can use to control these pests. We will see that each employee plays a part in the control of insects and rodents within and about the establishment. We will also learn that there are special precautions that must be taken when we use poisions in our insect and rodent control program.

B. Relationship of Insects and Rodents to the Spread of Disease

1. Interest in all insects and rodents.

Like man, all insects and rodents must have food to live, and, since the beginning of time, insects and rodents have fed upon and fouled man's food supply. We are interested in the control of all insects or rodents that destroy or contaminate our food supply, but fortunately relatively few of these spread disease through food. These are the ones with which we are most concerned in our discussion. These are the rat, the housefly, and the cockroach.

2. Main interest and problem: rats, houseflies, and cockroaches.

You will recall that in our lesson on microorganisms and their relation to man we learned that diseases can be spread from their source to man by several means. One of these is by insects and rodents. The rat, the housefly, and the cockroach can spread disease and filth to us through food. We have learned that in order to prevent outbreaks of foodborne illness we must break the chain of infection or contamination. The best way to break the chain of infection or contamination insofar as rats, flies, or cockroaches are concerned is to keep them out of our establishments entirely. Of course, any establishment may have an occasional pest, and we must protect food and utensils from those that do get in despite our best efforts; but it is the continual presence of insects or rodents that causes the major problems and indicates a lack of good sanitation and control measures.

C. Basic Elements of Insect and Rodent Control Program

No single measure will completely control the problems associated with the insects and rodents that infest food establishments. However, when we condense all the elements of an insect and rodent control program we find that this program is composed basically of two phases. These phases are not separate and distinct. They are integral parts of each other, and one phase cannot adequately control the problem without the help of the other. Since each of these phases may be different for different types of pests, we shall discuss specific measures that we can use for effective control when we discuss specific types of insects and rodents.

1. Basic environmental sanitation.

The first of these two phases is the institution of basic sanitation measures such as proper refuse and garbage storage and removal to control the environment by preventing harborage for the breeding of the insects or rodents in or about the premises. It also includes installation of screens or door flashing to prevent the entry of pests into the establishment.

2. Effective chemical control of pests.

The second phase is the use of chemicals or pesticides to control insect and rodent pests that may gain entrance to the premises, whether within the building or on the property outside the building.

D. Housefly: Description, Habits, and Control

1. Description and habits.

Although there are many kinds of flies, the one that concerns us most in food establishments is the common housefly. The housefly carries disease bacteria on and in its body. It lives and breeds in filth, such as garbage, the body wastes of humans and animals, sewage, and if we allow it, in our food. When a fly walks over filth, he scrapes off some of the material, and it sticks to his hairy body. If disease bacteria are in the material, they, too, stick to his body. Also, when he feeds on the waste material, he takes some of the bacteria into his intestines. The fly then buzzes off to the kitchen or dining room where he walks over the food we eat and the utensils we use. As he walks over these, some of the bacteria are brushed off his body and onto the food or utensils.

Perhaps even more repulsive is the fact that the housefly has to vomit on solid food to soften it before he can eat. This is because the housefly cannot chew. In the vomiting process, of course, some of the bacteria that he has previously eaten are spread upon the food. Also, bacteria are present in the excreta of the fly. We know this as "fly specks."

Flies transmit the organisms of more than 30 diseases, such as dysentery, salmonellosis, typhoid fever, tuberculosis, chlorea, and even pin worms. It has been reported that a single fly can carry as many as 6 million bacteria on the outside of its body and as many as 25 million in its intestines.

It is easy to see how flies carry bacteria and spread disease and why it is so important to control flies about the establishment. It is also obvious that flies are filthy creatures, and, even if we could be sure that there were no disease bacteria on the particular flies that we see walking on our foods, we would still consider them very objectionable.

2. Life cycle and control measures.

a. Life cycle.

Some people seem to think that flies "just happen" and must be tolerated. Of course, we all know this is not true. When we learn something about the life cycle of flies, we can see even more clearly when they are so repulsive.

Flies come from eggs laid by the female fly. An adult female housefly may lay as many as 3,000 eggs in a lifetime. These eggs do not hatch exactly like hen eggs; there are two steps from the egg to the adult fly. The eggs first hatch into maggots, which are the little white worms that we can find wiggling around in decaying garbage and other filth. These change after several days into small, hard, brown capsules called pupa. From the pupa, full-grown flies emerge after several more days. The whole process, from egg to adult, takes only 10 to 14 days in warm weather.

With such rapid development, it is easy to see that a tremendous number of flies can be raised in a single summer. It has been estimated that the total number of children, grandchildren, and other descendents, of a single fly would amount to about 140 pounds in 40 days, allowing 2,880 flies to the ounce and assuming that only half of them lived. That is more than 12 million flies. This estimate shows how much easier it is to get rid of flies in the spring than late in the summer, for it is easier to kill one fly than all the offspring from a single fly.

The principle breeding place of houseflies is in moist organic materials, such as piles of garbage, rotting vegetables, manure, and most types of decaying animal matter. They will even breed in the soil where liquids from garbage cans have drained.

The flies "hatch out" only during warm weather, and they are killed by the first few cold nights in the fall. Adults flies do not live through cold winter weather. The maggots and pupae may live through the winter, however, in manure piles or under the soil, and flies may continue breeding all winter inside warm buildings where food and suitable breeding places are available.

b. Control measures.

The best way to control flies is to do away with their breeding places. This means that decaying vegetables and animal matter, garbage, and manure piles must be frequently cleaned up and removed. Such material must never be allowed to remain for more than about 4 days. If the breeding places are removed, the fly population will be greatly reduced. If you want to find out whether flies are actually breeding in a particular place, dig into the drying parts of the pile 1 to 2 inches and look for the maggots, which are smooth, white, moist-looking, and about half an inch long. In many cities, it is possible to eliminate flies almost entirely by cleaning up breeding places, but flies may travel as much as 500 yards from their breeding places. We do not always have control over areas this far from our establishments, and flies may be present. Consequently, it is usually necessary to use other fly-control methods as well. The most familiar method, of course, is screening of doors and windows. Screening is effective if the screens are kept in good repair, if *all* openings are actually screened, and if fly-fans are used at any doors that are used a great deal or where screens are not practical.[1]

In many cases, some flies will enter in spite of good screens and fans, so a regular routine should be established for the control of flies that do find their way into the establishment. Spraying, poison baits, and other insecticides are effective, but they must be safe to use and be used only in the manner recommended on the container label. Never think that if one application is recommended, two applications may be twice as good. Insecticides can kill people just as dead as they do flies. So be sure; play it safe. It usually is more effective and just as inexpensive to employ a reputable pest control operator to do all your pest control work.

In addition, scrupulous cleanliness of floors, tables, garbage cans, and garbage-can cleaning areas should be made a routine practice, to reduce the amount of food accessable to flies and to make the establishment less attractive to them. Toilet fixtures should be kept clean. Food should be kept covered so as not to be exposed to contamination by flies.

We can summarize briefly the fly-control methods that we have talked about:

Clean up and remove all fly breeding places.
Screen the restaurant thoroughly, using fans or other methods where necessary.
Kill the flies that do get in by spraying, swatting, poisoning, and trapping.
Keep garbage cans clean and covered when not in use.
Keep toilets and the entire establishment clean.
Keep food protected from flies.

Some of these control measures are a responsibility only of the management and not of the employees—providing screens and fans, for example—but there is a great deal all of us can and must do to control flies.

E. Cockroaches: Description, Habits, and Control

1. Description and habits.

It has been estimated that cockroaches have been in existence for 300 million years, and have been associated with man for centuries. Cockroaches are capable of carrying disease organisms and are very offensive.

Scientists have found that cockroaches that feed on human body wastes containing disease organisms take these bacteria into their bodies. Later, these organisms may be found in the body wastes of the cockroaches. They also may carry microorganisms on the outside of their bodies as they crawl from toilets and sickrooms to the foods and utensils in the kitchens and dining rooms. Thus, they may actually drag disease organisms from place to place.

The sickening, offensive odor of cockroaches results from oily liquid given off by the scent glands. This odor will be noticed wherever there are large numbers of cockroaches. It ruins food. Utensils over which cockroaches have run may look clean but may give off the typical odor when warmed.

Few things are more disgusting to customers than the sight of cockroaches running over the wall, table, counter, or floor. They would be even more disgusted if they could see cockroaches in the kitchen where food is prepared.

2. Life cycle and control measures.

a. Life cycle.

Cockroaches hatch from eggs laid by the female. They are laid in bunches of as many as 25 to 30, inside a small, leathery sack. The sack may be dropped almost anywhere the cockroach happens to be, or it may be glued to some object, such as a shelf, by a kind of glue produced for this special purpose by the cockroach. The eggs hatch in a month or two, and the young cockroaches are usually not full grown until about a year. The "croton bug" or "water bug"—properly known as the German cockroach—may become full grown in less time, sometimes in only about 3 months. The growth of cockroaches is affected a great deal by the temperature and moisture of their surroundings and by the amount of food available. It will be remembered that these same three factors are of great importance to the growth of microorganisms. Compared with flies, which go from egg to adult in 10 to 14 days, cockroaches grow quite slowly.

---

[1] Fly-fans are not recommended within the Armed Services. Army regulations 420–10, 420–76, and 40–5 prescribe responsibilities for conducting measures for insect, rodent, and other pest control.

We know that cockroaches like to live where there is plenty to eat. They also like warm, dark, damp places. They usually hide in cracks, behind cabinets, in boxes, and inside hollow walls and similar places during the day. If one could see into these places, he might find tremendous numbers of cockroaches—so many that they completely cover the surface they are resting on and move like a huge herd of cattle when disturbed. Cockroaches come out to feed at night when it is dark and quiet. If many cockroaches are seen during the day, it is almost certain that many, many more could be found at night. The way to find out is to enter a room suddenly at night and turn on the lights. The cockroaches will immediately run for cover. The places to which they run should be remembered, for this knowledge will be very helpful when applying control measures.

Cockroaches get into buildings in several ways. They may crawl in through cracks and along pipes from nearby buildings, and they may be brought in with groceries and supplies from the store or warehouse. In warm climates, where the cockroaches can live out-of-doors, many of them simply crawl in through doors, windows, and other openings.

b. Control measures.

The control of cockroaches is difficult and must be made a routine affair. Most important of all is cleanliness. If floors, tables, walls, equipment, storage shelves, and the like are kept absolutely clean, little food will be available for cockroaches. All food and supplies brought into the restaurant should be carefully checked for cockroaches, and any cockroaches present should be killed. Supplies should be stored off the floor and in an orderly fashion to make cleaning easy and to reduce the number of hiding places. Frequent cleaning of all parts of the establishment will help remove the eggs that may have been laid and, hence, will reduce the number of cockroaches that can hatch.

In warm climates, tight-fitting doors and windows will keep out many cockroaches. In all climates, openings or cracks in walls and floors should be closed up with putty, plastic wood, or a similar material to do away with hiding places. Openings around pipes should be closed also, because pipes coming in from another building or from the basement may be a highway for cockroaches. In new buildings, it is a good idea to use a type of construction that will not provide hiding places.

It is very hard to entirely prevent cockroaches from getting into a building. Once they are in, they must be killed by some type of cockroach poison. Many newer types of insecticides are effective for the control of cockroaches and can be applied safely by trained individuals. But remember, probably the most economical and effective way to apply insecticides is to employ a reputable pest control operator to do the job on a routine basis.

The most important points in the control of cockroaches are:

Fill cracks and roach entryways with putty, plastic wood, etc. Provide tight-fitting doors and windows.
Inspect incoming supplies and kill any cockroaches present.
Keep the entire establishment neat, clean, and free of all food scraps.
Keep food covered.
Use effective chemical control measures.

F. Rats: Description, Habits, and Control

1. Description and habits.

Rats may carry a number of disease. They eat and damage large amounts of food. Salmonellosis, leptospirosis, plague, and murine typhus fever are examples of diseases that may be spread by rats.

Rats cause a tremendous money loss because of the food they eat and spoil and the damage they do to buildings and property. It has been estimated that each rat in the United States eats at least $5.00 worth of food in a single year and destroys or damages about ten times as much food and property. It has been estimated that there is at least one rat for every person in the United States. This means that the rat population of the country is probably greater than 200 million. Hence, the total cost to the country in supporting our tremendous rat population is more than 10 billion dollars a year.

Rats have to gnaw constantly to keep their front or incisor teeth worn down. Because of this gnawing, rats damage all types of property: buildings, plumbing pipes, books, cloth, and leather.

When seeking a food supply or when cornered, rats will attack and bite humans, especially babies or young children. Once you have seen a severely rat-bitten child you will never forget it.

Rats contaminate everything they touch, and foul much more. Food is contaminated by their droppings, their urine, and by the disease organisms that they carry on their bodies. All of these may get on any food or utensils with which rats come in contact.

Rats prefer to travel and hunt for food at night. They are creatures of habit and almost always travel from their nests to their food sources and to the outside over the same paths. Perhaps for protection, their paths usually are in narrow, out-of-the-way places, such as overhead pipes and beams, or along walls. When rats run from place to place, they hug the wall. Rat runs are easy to find because dirt and oil from the hair on the rat rub off and blacken the surfaces that they touch. Some rats are good climbers and can go up rough brick walls and even travel along telephone and power lines. Rats have been called man's most cunning and intelligent enemy, and a lot of planning and thought must be used to get the best of them.

2. Life cycle and control measures.

a. Life cycle.

Rats, like cats, are born in litters. A female rat has from three to five litters a year, with an average of seven or eight per litter. Their average life span is 2 to 3 years. Rats nest in convenient hiding places, such as trash piles, hollow walls, and the spaces between a wooden floor and the ceiling below. They like to live close to a good food supply, which is why they live in or near our homes and food establishments.

b. Control measures.

The most permanent method of controlling rats is to build them out. This means that buildings should be so constructed that there will be no hidden places for rats to nest in and no openings for them to enter.

A most important part of rat control is the removal of trash piles and refuse dumps that provide good nesting places. For an effective job, the entire area must be kept clean of such trash piles, but it is the responsibility of every person to clean up his own back yard and basement. This is especially true of restaurants. Material in storage rooms should be kept several inches off the floor and should be arranged neatly so that rats will have no hiding places.

Another important consideration is to keep the building and premises clean and free of food scraps that will attract rats. Garbage must be kept in cans with tight fitting lids. The lids must be kept on the cans at all times during storage.

Next to ratproofing, poisoning is probably the best way to get rid of rats. Remember, though, that poisoning will have to be repeated from time to time, because it only kills the rats that are present at the time of poisoning and does not prevent other rats from coming later. Poisoning and trapping should be started *before* ratproofing an existing building so that dying rats will not be caught inside the building with no chance of escape. The removal of a dead rat can create additional problems, especially if it is between walls that have been sealed. Probably the safest rat poison is "red squill." It should be remembered that this is a "one shot" poison. If the rat does not eat enough to kill him the first time, he will not touch red squill again.

Other rat poisons are available and some of them are quite satisfactory. The anticoagulant types are quite good in that rodents do not develop a "bait shyness." However, the rodent must consume this type of poison each day for several days for it to be effective. Remember, though, that all poisons must be applied by a person who is experienced in their use. They must never be used in a manner that will contaminate food or food-contact surfaces of equipment and utensils. We will talk more about safety in using pesticides a little later.[2]

Trapping, when done properly, is also an effective way to control rats after ratproofing and poisoning. The steel trap and the snap trap are the best traps to use for this purpose. Traps should be placed in rat runs and must be properly located and handled to be effective. They may be fastened in place with wire or nails. It will be necessary that baits be kept fresh and replaced often. Before attempting to poison or trap, it is best to get the advice of your city or county health department and to follow their advice closely.

---

[2] TB MED 144/NAVMED P-5052-26/AFM 161-3, "Rodent Control" provides guidance in selection and application of rodenticides within the Armed Services.

A brief review of the important points in rat control would include:

- Build rats out by proper construction and repair of buildings.
- Do away with trash piles, and store supplies neatly.
- Starve rats; keep food away from them by
  - Keeping the building clean,
  - Keeping garbage cans covered,
  - Keeping food covered. Protect food in storage rooms from rat gnawing.
- Trap or poison rats inside and outside buildings.
- Seek the advice of your health department or professional pest control operator before beginning a poisoning program.

As you have noticed, the methods used for controlling rats, cockroaches, and flies are similar in many ways. First, it should be made difficult for the pests to get into the restaurant. This can be done by insisting on proper construction, closing up cracks and other openings, and providing proper screens. Second, all necessary means should be used to kill the flies, cockroaches, and rats that do get in, and this control must be repeated as often as necessary to keep them under control. Third, we must keep food away from the pests by keeping the restaurant building thoroughly clean, garbage in covered containers, food covered, and supplies properly stored. Cutting off the pest's food supply is an important method of control.

You have noticed that the importance of cleanliness of the premises in insect and rodent control has been mentioned again and again. This is because insects and rodents breed and live in dirt and filth. We know that these pests carry disease. Since it is obvious that cleanliness has definite value in preventing disease, it should be easy to see why it is so important to keep everything in a food service establishment clean, spotless, and shining.

Keeping things clean and keeping out rats, cockroaches, and flies is not always easy, but IT CAN BE DONE.

G. *Other insects*

Although our main interest in the control of insects and rodents in food establishments is with rats, flies, and cockroaches, there are other insects that cause problems. These are the insects that infest stored food products.[3] Several types of mites, beetles, bugs, or moths frequently cause problems by infesting and destroying food. They seldom cause disease but are considered adulteration of the product, making it filthy and unwholesome. The foods most frequently infested are those that are dry: dried fruits, cereals, grain, flour, candy, and nuts. Control of insects infesting stored foods can be a large problem, but our principles of sanitation also apply very well.

- Inspect incoming supplies to see that they are not infested. Thus, you will limit the chance of introducing them into the establishment.
- Use old stock or supplies first. Remember our rule of first in, first out.
- Remove or clean up any spillage, and destroy any infested foods.
- Open only sufficient numbers of containers to supply immediate needs.
- Store loose or bulky foods in durable containers with tight-fitting lids.

There may be specific problems involved in the control of insects infesting stored food. The best place to obtain expert advice in controlling these infestations is from your local health department.[4]

H. *Safety Guidelines for the Use of Pesticides*

Pesticides by their very nature are made to kill; therefore, we must recognize that they will kill or seriously impair the health of man if they are improperly used.

We have pointed out that pesticides, whether used against insects or rodents, should be applied by a reputable professional pest control operator. Such a person knows how to handle these toxic substances and will do so with the greatest care.

However, you, too, as an operator or an employee of a food service establishment, should know the safety guidelines for the use of pesticides in the event you may have to use them yourself.

---

[3] Army TM 5-632/NAVDOCKS MO-310/Air Force AFM 85-7, Military Entomology Operational Handbook, provides guidance pertaining to control of insects infesting stored food.

[4] In the Army and Air Force, check with your installation preventive medicine section and/or installation engineering section.

Read and Understand the Label on the pesticide container for preparing and applying the pesticide.

Know the material being used.

Avoid prolonged exposure to the spray agents, and wear protective clothing and headgear.

Do not use the material in any way that will result in the contamination of food or drinking water of man or animals.

Store pesticides in properly labeled containers in a secure place away from food.

Handle insecticidal concentrates with extreme care.

Dispose of empty containers safely, and flush insecticidal equipment into areas where contamination will not affect man or wildlife, or contaminate food.

Know the emergency measures for treating accidental poisoning.

I Summary

In this lesson, we have seen that insects and rodents play a significant role in the spread of disease. We have learned that there are many methods by which these pests can be controlled and that these methods are basically the same for all types of pests. We can say that there are really three basic steps to the control of insects and rodents.

Build them out.
Starve them out.
Kill them if they get in.

These three steps are included in the two phases of an effective insect and rodent control program: basic environmental sanitation and effective chemical control.

In our next lesson, we will discuss a topic that is directly related to the control of insects and rodents and all other operations of the establishment: good housekeeping practices and how they relate to sanitation.

Questions for Use with Lesson 6

INSECT AND RODENT CONTROL

True	*False*		
☐	☐	1.	In a food service establishment, the insects or rodents with which we are principally concerned are houseflies, cockroaches, and rats.
☐	☐	2.	A continual problem with insects or rodents in a food service establishment would indicate a lack of good sanitation and control measures.
☐	☐	3.	The basic elements of an effective insect or rodent control program includes elimination of breeding places as well as the use of chemicals to kill the pests concerned.
☐	☐	4.	Although flies are filthy creatures that breed and live in decaying garbage and trash, they do not spread disease.
☐	☐	5.	A single female fly may produce more than 3,000 offspring in a lifetime.
☐	☐	6.	The complete life cycle of the fly, from egg to adult fly, generally takes no more than 10 to 14 days.
☐	☐	7.	When beginning a fly control program, it is best to begin the program with the use of fly sprays, baits, or other chemicals.
☐	☐	8.	When using chemicals for the control of insects or rodents, the recommendations for use as given on the container label must be rigidly followed.
☐	☐	9.	Cockroaches in large numbers may give off a characteristic oily odor.
☐	☐	10.	It is easy to control cockroaches in a food service establishment by the use of chemicals alone.
☐	☐	11.	It is relatively easy for cockroaches to infest a food service establishment since they may be brought into the establishment with supplies.

True	*False*		
☐	☐	12.	It may be difficult to determine when an establishment has an infestation of cockroaches since they are seldom seen during the day.
☐	☐	13.	Probably the most economical way to conduct a program for the chemical control of insects and rodents is through a reputable pest control operator.
☐	☐	14.	It has not been established that rats can spread disease.
☐	☐	15.	The amount of food destroyed or damaged each year by rats is many times the total amount consumed by rats.
☐	☐	16.	The most effective way to control rats is to build them out of the establishment.
☐	☐	17.	Trapping of rats has very little effect on their control.
☐	☐	18.	Insects other than cockroaches and flies are of concern to a food service establishment operator because they infest and destroy food rather than transmit disease.
☐	☐	19.	The responsibility for the control of insects and rodents in a food service establishment is that of management and not of employees.
☐	☐	20.	One of the safety guidelines for the use of pesticides is to read and understand the label on the pesticide container.

Lesson Seven

Housekeeping and Waste Disposal Practices

Page

Lesson Plan 84

Lesson Manuscript 85

  Principles to be Taught 85

  Introduction 85

  What is Good Housekeeping 85

  Elements of a Good Housekeeping Program 86

  Summary 90

Questions 90

Lesson Plan No. 7

Principles to be Taught

The relationship of housekeeping and sanitation

An appreciation of the fact that housekeeping is the responsibility of all employees

Relationship of housekeeping and waste disposal to control of insects and rodents

The need for developing definite work assignments with instructions to properly carry out these assignments

A. Introduction

B. What is Good Housekeeping

1. Good housekeeping program.
2. Design and construction features.
3. Establishment of definite work assignments.

C. Elements of a Good Housekeeping Program

1. Floors, walls, and ceilings.
    a. Floors.
    b. Walls and ceilings.
2. Ventilation.
3. Lighting.
4. Cleaning of equipment and working surfaces.
5. Toilet and handwashing facilities.
6. Locker and dressing rooms.
7. Storage of soiled linens, cleaning cloths, and clothes.
8. Garbage and refuse disposal.
9. Storage of cleaning compounds (poisonous and toxic materials).

D. Summary

Lesson Manuscript No. 7

Principles to be Taught

The relationship of housekeeping and sanitation

An appreciation of the fact that housekeeping is the responsibility of all employees.

Relationship of housekeeping and waste disposal to control of insects and rodents

The need for developing definite work assignments with instructions to properly carry out these assignments

A. Introduction

In our previous lesson, we learned much about how insects and rodents may spread disease organisms through a food establishment and how these pests can contaminate food, dishes, utensils, and equipment. We have found that insects and rodents not only spread disease through food, but are filthy creatures that can foul our food supplies. We have also discussed many of the factors that we as employees can practice to control insects and rodents, and we learned that an effective insect and rodent control program is composed of two phases: control of the environment through basic sanitation procedures, and control of the insects and rodents with chemicals.

In our lesson today, we will be discussing many factors that relate not only to the control of insects and rodents, but also to all aspects of sanitation within the establishment: housekeeping and waste disposal practices. We will learn that these practices have a significant effect upon whether disease bacteria and, consequently, foodborne illness is transmitted to the consumer. We will see that we are all responsible for maintaining good housekeeping practices and that these practices can be better accomplished if we have definite work assignments with instructions to properly carry out these assignments.

B. What is Good Housekeeping?

Good housekeeping means keeping the entire establishment clean and sanitary, and making it a more pleasant place for the patron to visit as well as a better environment in which to work. Management knows that good housekeeping is good business, for it materially assists in making the establishment more attractive to customers, as well as making it a cleaner place in which to eat. Good housekeeping helps to break the chain of infection from the source of the disease to the patron. It also helps prevent accidents and makes a safer place in which to work.

1. Good housekeeping program.

A good housekeeping program is an integral part of the operation of the establishment, and, like all other operations, it is a primary responsibility of the management. Management, however, cannot fulfill this responsibility without the cooperation and assistance of all employees.

It is management's responsibility to provide the equipment, facilities, and instruction or training necessary for employees to perform successfully their assigned responsibility. It is immediately evident that good housekeeping and all aspects of sanitation can be attained more easily if facilities and equipment are designed and constructed with consideration for ease of maintenance and cleaning.

2. Design and construction features.

Numerous construction and installation features promote ease of cleaning in kitchens and throughout the establishment. For example, overhead equipment, such as hoods, should be within reach for cleaning. Large equipment should be installed on legs or be movable, and so located that it may be cleaned behind and underneath. By using casters and flexible service connections to facilitate ease in moving heavy equipment, the cleaning of that equipment is promoted.

Drains should be located in areas where there is likely to be spillage and should be situated to permit satisfactory drainage when scrubbing is done. Adequate and conveniently located service sinks and handwashing facilities promote their use and materially assist in keeping the establishment and the food clean.

Storage for cleaning equipment should be located where the equipment can be readily reached for incidental cleanings as needed. However, even with the best designed and most modern equipment and facilities, an establishment will not keep itself clean. Therefore, we return to what has been a major point in our entire course: it is the individual who plays the most significant part in the spread of disease through food, and it is his responsibility to see that the chain of infection is broken by practicing the proper sanitation and food handling practices at all times. Good housekeeping is another method that will break that chain of infection.

3. Establishment of definite work assignments.

A most effective way in which to have good housekeeping practices, as well as establishing other sanitation practices throughout the establishment, is to have definite work assignments with written instructions on the proper procedure to complete these assignments. Thus, if the job of cleaning a specific piece of equipment such as a meat slicer is assigned to a specific employee and he is given written instructions as to how the slicer should be cleaned and the frequency of cleaning, there is no excuse for the equipment not being cleaned. Of course, management may first have to instruct this employee in the proper procedure for cleaning, and then supervise the employee to see how well this procedure is followed.

Such work assignments should be established for each job within the establishment. Thus, when some part of the job is not completed properly, the reason for not completing the assignment in the correct manner can be discussed with the employee involved and appropriate remedial action taken. Writing down what needs to be done makes it necessary for management to analyze the job, and frequently reveals short cuts or more efficient ways of accomplishing it.

C. Elements of a Good Housekeeping Program

Many elements are to be considered when planning a comprehensive housekeeping program. The outside as well as the inside of the establishment must be considered, for frequently insanitary conditions found inside the establishment originate outside the establishment.

Let us consider the major areas of concern, discuss some of the problems associated with them, then consider some possible solutions.

1. Floors, walls, and ceilings.

a. Floors

Although, in the construction of a building, it is management's responsibility to provide floors, walls, and ceilings that are easily cleanable, all employees are concerned with keeping them clean. The major responsibility for keeping these facilities clean and in good repair lies with the maintenance and cleaning crew; however, other employees can assist in making their job easier. Thus, a waitress or waiter who spills food or breaks a glass should clean up the debris immediately or bring it to the attention of the cleaning crew instead of ignoring it or brushing it aside for cleaning later. Ignoring it or brushing it aside would probably make it more difficult to clean later, or it might be forgotten completely or result in a safety hazard in the meantime.

Many types of floor surfaces may be encountered in a food establishment: carpets in the dining areas and concrete, terrazzo, ceramic tile, plastic, and linoleum in all areas. The list is long. The proper type of floor must, of course, be considered for the job it is to do and must be easy to clean. Special-type floors may need special cleaning procedures; therefore, care should be taken when dealing with floor cleaning. When special problems arise, your local health department is a source of information on proper cleaning procedures.

b. Walls and ceilings.

All walls and ceilings, including doors, windows, skylights, and similar closures, should be cleaned frequently and kept in good repair. Light-colored walls that are smooth are especially important in utensil-washing and hand-washing rooms or areas and in food-preparation areas. Soil on light-colored walls can be more easily seen and is more easily removed from surfaces that are smooth. Light-colored walls aid in giving a more even distribution of light.

Diners do not appreciate seeing walls, ceilings, or equipment that is grease coated or has not been cleaned. This lack of cleaning can convey to the diner the thought that sanitation throughout the establishment is not adequate. The patron may not mention this fact to you or the manager, but it may result in his not returning as a patron.

2. Ventilation.[1]

Rapid and excessive accumulation of grease or soil on walls and ceilings is usually an indication of inadequate or improperly operated and maintained ventilation or exhaust equipment.

Proper ventilation of a food service establishment reduces condensation that may promote mold and bacterial growth, or that may drop into food or utensils, or on food preparation surfaces. Proper ventilation also minimizes soiling of walls and ceilings. It removes excessive heat, objectionable odors, and the concentration of noxious gases. It facilitates the removal from the establishment of air that becomes contaminated or odorous during cleaning operations, during certain food preparation activities, or from heating, cooking, or other types of equipment. It also assists in creating a more pleasant atmosphere in which the patron may more fully enjoy his meal.

Fires in food establishments are frequently started as a result of inadequately cleaned kitchen exhaust systems. So remember, cleaning these systems is not only for sanitation reasons, it also is fire protection.

3. Lighting.[2]

Although high levels of illumination are not needed or even desirable at all locations in the establishment, we are especially concerned with the amount of light in the kitchen, other food preparation areas, storage rooms, handwashing areas, and garbage and refuse storage areas. If we can more readily see an area or a piece of equipment that needs cleaning, it is more likely to be cleaned. Well-lighted areas create a more pleasant work environment and promote job efficiency. Therefore, adequate lighting is needed in all parts of the establishment. For example, the light in storerooms should be sufficient to easily read labels, identify colors, and recognize the condition of food.

Special lighting effects, often very soft, are used to create mood or atmosphere in dining rooms. This is acceptable during the time of serving; however, during cleaning, additional lighting is needed for an adequate job to be accomplished. Therefore, supplementary lighting should be provided or the lights arranged with a dimmer device that can be turned up when cleaning is to be done.

Wherever the location, the provision of ample light, properly distributed to do the job, can and does materally assist in more adequate housekeeping.

4. Cleaning of equipment and working surfaces.

During Lesson Five, we discussed the specific procedures that must be followed to provide adequate cleaning and sanitizing of equipment and utensils. We have also mentioned repeatedly throughout this course the necessity for good cleaning and sanitation practices. All of these are a part of good housekeeping. All surfaces upon which food is prepared should be cleaned and sanitized regularly. Equipment also must be cleaned routinely and inspected and adjusted to insure proper operation. Such procedures assure that foodborne disease organisms will not be transmitted through improperly cleaned and sanitized equipment. Routine maintenance also assures that equipment will operate properly and last longer, thereby resulting in greater profit for the owner.

Safety is a most important aspect of any operation and should always be in the mind of the food service employee, especially when disassembling and cleaning electrically-powered equipment. Such equipment should be disconnected before beginning the cleaning operation to prevent accidental operation and possible serious injury. Remember, prevention has been one of our major themes throughout this course, and it is just as important to prevent an accident as it is to prevent an outbreak of foodborne disease.

Once a piece of equipment has been cleaned, it should either be reassembled and then covered to prevent contamination, or its parts should be stored in a clean protected place for later reassembly. A cleaning schedule and procedure for each major piece of equipment, such as a meat slicer, grinder, dishwashing machine, or mixer should be developed. The responsibility for cleaning each piece should be assigned to a specific person and that person instructed as to how to clean it properly. By use of this procedure, management can be better assured that the individual assignments will be carried out.

5. Toilet and handwashing facilities.

When we remember that our chain of infection for foodborne disease is usually from man to man by the transmission of fecal matter from one person to another through food, we can see why adequate, sanitary toilet facilities for the proper disposal of human excrement are necessary in a food establishment.[3] Management must supply these, of course, but the employee has responsibilities too.

---

[1] In the Air Force, see AFM 88-15 and AFM 161-6 for detailed requirements.

[2] In the Air Force, see AFM 88-15 for specific requirements.

It is the responsibility of each employee to use toilet facilities in the proper manner and leave them in a clean condition for the next person. Toilet facilities that are not properly maintained are left open to invasion by insects and rodents. As we have seen, these pests have no consideration for where they travel and may carry disease bacteria and filth from toilets to the food in our establishments.

As we have learned, hands are probably the most common vehicle for the transmission of contamination to food. Therefore, handwashing facilities and good handwashing practices are a part of good housekeeping practices. We have discussed why this is so. If our hands are not frequently washed, especially after visiting the toilet, food may become contaminated with disease bacteria or even with our own body wastes.

Clean handwashing facilities conveniently located in the food service area are more likely to be used, thus making it easier for us to follow good housekeeping and handwashing practices. Convenient may mean that more than a single lavatory needs to be provided. In all kitchens, a lavatory should be provided in the food preparation area. In large kitchens, this means that several may be needed, since the various work areas are separated and workers are unlikely to walk any great distance or from one section to another every time their hands become soiled and need washing. Of course, such facilities should have soap and individual towels or other hand-drying devices. Common towels are not permitted, and, when disposable towels are provided, waste receptacles must be located convenient to the handwashing facilities. As we wash our hands, it is our responsibility to leave the facilities clean and neat for the next person. It takes only a few seconds to rinse the bowl of the lavatory after each use, but it may take considerable time for the next person to clean up the mess we make. Since the next person may not tidy the bowl, the facilities are soon in a very insanitary condition.

6. Locker and dressing rooms.

All food establishments cannot have separate or spacious locker and dressing rooms in which employees may change and store their clothes. However, each establishment should have dressing rooms or a specified area for employees' use. Of course, this should be separate from food preparation or serving areas, and from the utensil washing and storage areas. Clothing should be hung on hangers or hooks. Clean and orderly dressing rooms or areas and related facilities contribute toward proper employee attitude for neatness, orderliness, and cleanliness throughout the establishment. When one employee sees his fellow workers making an effort to keep the establishment clean, he is likely to do so himself.

7. Storage of soiled linens, cleaning cloths, and clothes.

Soiled linens, cleaning cloths, aprons, and garments may become harborage for insects or rodents if improperly stored. Frequently, these articles are discarded in corners of locker rooms or storage rooms and are forgotten and allowed to sour and become a harborage for pests, as well as creating cleaning problems.

Soiled linens, cleaning cloths, and clothes should be stored in nonabsorbent containers or laundry bags until they are removed for laundering. Cardboard boxes, wooden boxes, or wicker baskets are not suitable for storage of these articles since they quickly become soiled and cannot be cleaned.

8. Garbage and refuse disposal.

The sanitary storage of garbage and refuse awaiting disposal is a commonly neglected phase of food establishment operations. Battered, leaky cans with covers missing are all too frequently encountered. We have discussed the significance of proper garbage handling and disposal of refuse in the control of insects and rodents, and we are acquainted with the problems that inadequate garbage and refuse disposal cause.

Unless a garbage can is actually in frequent use, it should be kept tightly covered. Garbage cans or containers should be fly-tight and leak-proof. The liquid that drains from garbage cans and soaks into the ground, provides a place in which flies may breed. Thus, we may have seemingly clean and sanitary premises and still have fly breeding going on without our knowing it. The good food service worker should be alert to such conditions and, if they are found, should notify management.

Garbage and bits of food that patrons may discard through the windows of their cars at drive-in operations provide ample food for both flies and rodents if such waste is not cleaned up daily or even more frequently.

---

[3] Air Force Manual 161-6 indicates that mops and brooms for use in dining and cooking areas will be kept separate from those used in the latrine and garbage rooms. Each group of mops and brooms will be appropriately stenciled and used in the designated area.

The use of plastic liners for garbage and refuse storage containers provides an easy method for removal of the contents and facilities cleaning. The time saved in cleaning the containers may be well worth the extra cost.

The open burning of refuse consisting of waste paper, crates, tin cans, glass, and similar discarded materials is not a successful or sanitary method of disposal. Wrapping paper, tin cans, crates, and other packaging materials frequently contain bits of food upon which flies and rats may feed. Also, the burning operation is seldom complete, leaving this material accessible to insects and rodents and also causing an unsightly mess about the premises. Frequent pickup, at least daily, is necessary, and, until picked up, such materials should be stored in containers.

9. Storage of cleaning compounds (poisonous and toxic materials).

A good housekeeping rule that we should remember is: a place for everything and everything in its place. When followed, this rule goes far in helping to keep a clean, neat, and sanitary establishment. It is one that we should be doubly sure to follow when dealing with poisonous substances such as those used to control insects and rodents. This same rule applies to toxic substances such as bactericides, cleaning compounds, and other compounds in use in the establishment.

Only those compounds that are absolutely necessary for maintaining the premises in a sanitary condition or for use in sanitizing operations should be in the establishment. Poisonous and toxic materials should be stored in a separate cabinet that is used for no other purpose. It must be located outside the areas used for food preparation, food storage, and storage of cleaned equipment and utensils. To prevent accidents and mistaken use, bactericides and cleaning compounds should not be stored in the same cabinet or area of the room with insecticides, rodenticides, or other poisonous materials.

Bactericides, cleaning compounds, and other compounds intended for use on food-contact surfaces of equipment and utensils should be used only in the prescribed manner so as not to leave a toxic residue on the surfaces or constitute a hazard to the customer. Read the label and follow directions. It does not follow that if an ounce is good, 2 ounces are twice as good.

At one time, polishing compounds containing cyanide, a poison, were frequently used in food establishments. They are still available, but newer polishing materials are just as effective and much safer. The poisonous ones should not be used or stored in a food establishment.

Poisonous compounds, such as insecticides and rodenticides in powdered form, should have a distinctive color so that they will not be mistaken for such foods as sugar, flour, or salt. They must be used in such a manner as not to contaminate food, utensils, or equipment, or constitute a hazard to employees or customers. Again, read the labels and follow directions when using these compounds. Make sure that the person responsible for using them knows how to use them safely. Better still, use the services of a professional pest control operator. He knows his job and will probably be less expensive in the long run.

10. Storeroom care.

There is no better evidence of good housekeeping than a clean, orderly stockroom. A stockroom represents an investment, often of thousands of dollars, and should be clean, well lighted, and ventilated.

An inventory, simply set up and accurately kept, is important and is easy to take in a stockroom that is well planned and orderly. The alphabetic arrangement of stock on shelves, with labels visible, simplifies issuing supplies as well as taking inventory. The firmly established rule of completely emptying boxes, cartons, and containers of food or supplies before opening another, aids in maintaining the storeroom and prevents waste. It may be advisable to empty bulk products such as sugar, flour, or dried vegetables into tightly covered containers constructed of a durable nontoxic material. This protects the products from outside contamination, such as rodents, insects, and dust. Containers on casters are more easily moved. All products and supplies should be stored on shelves or platforms to permit adequate cleaning of the storeroom floor.

Rotating merchandise is most important. The first-in-first-out policy is the one to follow. New merchandise goes on the back of the shelf, while the old is moved to the front and used first. Having no more than a month's supply on hand is generally good business.

Plan the stockroom so that products used most are near the entrance. This saves steps and time. A stockroom should not become a catch-all for old reords and discarded equipment. Foresight in planning, cleanliness of floor and shelves, and accuracy in inventory-taking are essential to a good, well-run stockroom.

D. Summary

In this lesson, we have seen that good housekeeping practices are the basis for the maintenance of a clean and sanitary establishment. Good housekeeping practices really consist of all the sanitary procedures that we employ to serve safe, wholesome food to our customers. We have discussed many of the aspects that go to make up a good housekeeping program. We have learned that it is the responsibility of management to provide the facilities and equipment necessary to carry on that program. However, it is the employee's responsibility to know and practice the good housekeeping procedures that have been outlined. We have learned throughout this lesson and this course that it is only by all employees knowing and conscientiously applying good food handling, as well as good housekeeping and sanitation practices, that we can be assured of serving our customers tasty, nutritious, safe, and wholesome food.

Questions for Use With Lesson 7

HOUSEKEEPING AND WASTE DISPOSAL PRACTICES

True *False*

☐ ☐ 1. The construction of the building and installation of the equipment in a food service establishment relates directly to the effectiveness of the housekeeping program of that establishment.

☐ ☐ 2. A food service establishment that has the latest and newest of equipment can be assured of being a clean establishment.

☐ ☐ 3. An operator can be better assured of having individual jobs completed when he lets the person responsible for a specific job decide when that job should be completed.

☐ ☐ 4. In food preparation areas it is better to have walls and ceiling of a dark color so that food soil that may splash into the wall will not make an ugly spot.

☐ ☐ 5. Regardless of what type of material a floor may be constructed, the floor must be capable of being cleaned.

☐ ☐ 6. The most important reason for proper ventilation of a food service establishment is to promote patron comfort.

☐ ☐ 7. Walls and ceiling that quickly become soiled may indicate an ineffective ventilation system.

☐ ☐ 8. The provision of ample light in a food service establishment is important because it promotes cleanliness within the establishment.

☐ ☐ 9. When cleaning electrically powered food preparation equipment, such as a meat slicer, the power cord should be disconnected before the equipment is disassembled for cleaning.

☐ ☐ 10. When hand-washing basins are located in the food preparation area, the food service worker is more likely to wash his hands when they become soiled.

True *False*

☐ ☐ 11. A neat and clean food service establishment is not an important factor in the morale of the employee who works in that establishment.

☐ ☐ 12. The conditions that exist on the outside of an establishment have little effect upon the conditions found within the establishment.

☐ ☐ 13. It is an acceptable procedure to store cleaning and sanitizing compounds in the storeroom with food supplies.

☐ ☐ 14. A clean, orderly stockroom is a good indication of a good housekeeping program.

☐ ☐ 15. Fires in food establishments are frequently the result of inadequately cleaned kitchen exhaust systems.

Lesson Eight

Follow-up Training and Application of What Has Been Learned

Page

Lesson Plan 94

Lesson Manuscript 95

- Purpose of this Session 95
- Introduction 95
- Management's Stake in the Follow-up 95
- Suggested Procedure for Follow-up 95
- Methods of Follow-up 96
- Factors to be Considered in Selecting Methods of Follow-up to be Used 96
- Assistance on the Job 96
- Group Meetings 96
- Refresher Training Courses 96
- Enrichment Devices 97
- Summary 97

Lesson Plan No. 8

Purpose of this Session

To supply the connection between food service employee training given and its application to the job

To determine the extent and quality of the food service employee's application of principles and techniques presented in the training session

To suggest changes found to be necessary and to give help needed for mastering skills, techniques, knowledge, and attitudes

To encourage and assist management in the development of on-the-job training for improvement of employee performance

A. Introduction

1. Importance of follow-up as a part of the training program.

2. Application of principles taught during course.

B. Management's Stake in the Follow-up

1. Management's involvement necessary for maximum benefit.

2. Supervisor ideal person to assist in follow-up.

C. Suggested Procedure for Follow-up

1. Determine extent of application.
2. Suggest changes.
3. Motivate.

D. Methods of Follow-up

1. Visits to job location.
2. Group conferences or meetings.
3. Enrichment devices.
4. Refresher training.

E. Factors to be Considered in Selecting Metheds of Follow-up to be Used

F. Assistance on the Job

1. Gets best results with small groups.

2. Permits direct observation of worker's performance.

3. Identifies areas in training which need further emphasis.

G. Group Meetings

1. Gets best results with management and supervisors.

2. Requires preplanning of objectives.

3. Explores techniques that have been used successfully.

H. Refresher Training Courses

1. Should be part of subsequent training.

2. Must contain new material and avoid repetition.

I. Enrichment Devices

1. Devices best used in combination with other methods.

2. Summaries of instructor's talk.

3. Supplementary reading material.

4. Hand-out material.

5. Limited usefulness.

J. Summary

1. Must have follow-up necessary to gain lasting improvement.

2. Must have cooperative effort between management and training personnel.

Lesson Manuscript No. 8

Purpose of this Session

To supply the connection between the food service employee training given and its application to the job

To determine the extent and quality of the food service employee's application of principles and techniques

To suggest changes found to be necessary, and to give help needed for mastery of skills, techniques, knowledge, and attitudes

To encourage and assist management in the development of on-the-job training for improvement of employee performance

A. Introduction

The follow-up, for purposes of our discussion in Lesson Eight, may be defined as any plan used to encourage and help the food service employees to apply the knowledge, skills, habits, and attitudes that were the subject matter of instruction in the training sessions.

The follow-up in a training program is one of its most important phases. Examination of a number of training programs has shown that failure to attempt any follow-up is widespread and that it is often the weakest part of the program. Without follow-up, the ideas generated and the principles taught during the training sessions may not be translated into action, and, without action, training is wasted. In addition to making training more effective, the follow-up should serve as a check on the training plan and, thereby, result in improvement. It provides another opportunity to stress and emphasize the important points discussed in the training session.

B. Management's Stake in the Follow-up

Unless restaurant management takes an active part in the follow-up, maximum results cannot be expected. Ideally, the follow-up should be made by the person in charge of operations at the place where the results of training are being utilized. Such follow-up should be in the form of routine on-the-job training instituted or planned by the management staff. Short training sessions of 15 to 20 minutes can easily be worked into daily schedules, and great improvement can be obtained through this type of on-the-job training.

The person who presented the formal training sessions, or the district sanitarian, should, from time to time, visit restaurant management personnel to offer assistance and advice on food service employee training problems. It will usually be necessary to supply continuous motivation, some further teaching, and adaptation, to secure maximum application. In addition, the instructor must assist in the interpretation of results.

Regardless of who does the follow-up, the essential point to be looked for in evaluating effectiveness of training is how well the training given is applied in the actual work situation.

C. Suggested Procedure for Follow-up

The suggested procedure outlined here is flexible and may embody any one or a combination of the methods of follow-up described in the following paragraphs. The sequence of the steps that follow, however, is in the most logical order.

1. Determine extent of application.

   Determine the extent and quality of the food service employee's application of the principles presented in the training sessions.

2. Suggest changes.

   Suggest changes found to be necessary, and give help needed for mastery of required knowledge, skills, habits, and attitudes.

3. Motivate.

   Motivate the food service employee to continue, or to begin, correct application. Provide incentives.

In using this procedural plan, the instructor should answer for himself such questions as: What is the best way to do it in this particular case? What notes do I have from the training session that will be of value in dealing with this individual, or these group members? How well has management been "sold" on this training program? What results will they want?

D. Methods of Follow-up

The methods used for follow-up training may take several forms, and they may be used singly or in combination.

1. Visits to job location.
2. Group conferences or meetings.
3. Enrichment devices.
4. Refresher training.

E. Factors to be Considered in Selecting Methods of Follow-up to be Used

Factors that should be considered in determining the method or methods that will be used in the follow-up training are similar to those considered in determining total training needs. Before selecting a single method or combination of methods, one must give proper consideration to:

The kind of training has been given,
General objectives of the follow-up,
Size of the group,
Time available for follow-up,
Availability of instructors,
Urgency,
Food service employee's attitude,
Objections and obstacles to be overcome,
Expected results,
Management's willingness to cooperate, and
Appraisal to be made.

Follow-up should always be provided for during the early stages of planning for the training program. In so doing, the follow-up becomes an integral part of the food-service employee-training course and not an appendage or afterthought.

F. Assistance on the Job

Assistance and encouragement on the job have a tremendous potential when the number of people to be reached in the follow-up is not large. This type of follow-up, individual in application, becomes more real and meaningful to the food-service employee and permits the instructor or management to observe the difficulties of applying certain principles, skills, and techniques during actual operations. This type of follow-up contact may be made through an interview, by observing the work of the food-service employee, or by giving him additional training on the job. Opportunities will arise during the course of a follow-up visit with the trainee to restate or review certain principles developed in the training sessions and to give coaching in the application of the principles to new and special problems. In addition, the assistance on the job will provide opportunity to spot additional needs that may be met through training and for which a new type or kind of training may be needed, or revisions that need to be made in the training program or sessions currently in operation.

G. Group Meetings

Group meetings or conferences of management or supervisory personnel who are charged with making the follow-up in training have been used effectively. This kind of follow-up may be used with large or small groups. These conferences must be well planned in advance as to objectives and ways and means of accomplishing the objectives. They should include reports from those members known to have made application of the training received, as well as from those who have experienced difficulty in making the desired application. Members of the group who have had problems should be given immediate help during the conference, though, in some instances, it may preferably be given later.

It is usually desirable to have the meeting presided over by someone who has overall responsibility for the work performance of the restaurant personnel. The instructor who gave the basic or initial training might in some instances serve as a sort of secondary chairman.

Group techniques that have been used successfully in the follow-up include:

Conferences in which a discussion of experiences in applying skills, techniques, etc., is the focal point.
Lectures.
Combination of lecture and conference.
Group instruction and discussion.
Individualization of instruction (not individual instruction).
Observation visits.
Study.

H. Refresher Training Courses

The refresher method of follow-up may be made a part of subsequent training sessions. When a refresher session is held, it should contain new material and not be just a repetition. When used as a part of subsequent training sessions, it has certain definite advantages, especially those received from group members' contributions and suggestions.

Refresher courses are frequently held by the official agency and can serve effectively when only a specific area such as dishwashing, needs to be reemphasized, although refresher courses should be a part of management's continuous inservice training program.

I. Enrichment Devices

Minutes and reports are valuable because they provide useful reminders for the group members. They must be carefully prepared, duplicated, and distributed to the trainees shortly after the close of the session. Minutes may also serve, in part, as an objective record of accomplishment. Carefully prepared summaries of lectures, when used as a follow-up for this kind of training, are usually preferable to the complete transcript.

Summaries of lectures, when distributed after the session, may provide the repetition necessary to fix the desired point firmly in the learner's mind. Supplementary reading can be helpful if it relates definitely to the subject matter or concept that the instructor has stressed in previous training sessions. Illustrated pamphlets, cartoons, graphic charts, and similar material can be prepared for handout during both the formal training session and the follow-up, and can be effective if thoughtfully planned to present the information in simple manner.

The distribution of this kind of reading material should be occasional rather than routine. This device in follow-up training is most likely to be successful if the material is distributed immediately after the end of the training session and is accompanied by a brief explanatory note that relates the material definitely to the conference or training session just completed. Articles appearing in magazines usually create an immediate interest and desire to learn for those persons who attend a related training session or conference. To be significantly effective, these articles should be condensed and informative and must dramatize their subject matter.

This type of aid, when used with the follow-up, has some very definite limitations. When used with members of groups accustomed to frequent reading, it has considerable potential. Its value and effectiveness as a follow-up with others may not be as great.

J. Summary

Following the formal training stage of this course, application and continuous follow-up are necessary to retain the improvement or gains made. Through this process the values of training may be realized to the greatest extent. A minimum of interference and a maximum of service to management, who must carry most of the responsibility during the application stage of training and insure continuation of gains made, are the bases upon which to build desirable and lasting results.

Cooperation and mutual understanding cannot be secured by ordering them into existence. Management support is necessary, and, where worthwhile programs of follow-up in training have been conducted, there has been executive approval and cooperation.

Effective follow-up training is possible when:

Restaurant management gives its support and backing,
The original training needs and courses are properly determined,
The training program is an integral part of the regular restaurant operations,
The training program is well planned and includes follow-up as a part of the plan,
There is correct handling of the training during the initial stage,
It is conducted under favorable conditions,
The skills are well used,
There are adequate means of continual checking,
There is sufficient interest on the part of food service employees, instructors, and restaurant management.

Throughout this course we have emphasized the need for effective training of food service employees. Training these employees, whether by management or by the official agency, is only part of the total food protection program. Training, no matter how effective, cannot do the job alone. It takes a combination of an effective food protection law or ordinance and a firm but uniform enforcement of that law, as well as conscientious food establishment operators and trained food service employees. Without any one of these, the program will not be completely successful.

PART IV

Appendices

Appendix A. Principles of Learning and Methods and Techniques of Teaching

There are certain general principles of learning that any instructor should know and be able to apply in teaching. These principles, the basis for instructional methods and techniques, are generalizations that describe the conditions under which learning takes place. They serve as guides to the instructor in his selection and use of teaching methods, devices, and techniques. They are mutually supporting and all apply to all aspects of instruction.

A. Basic Principles of Learning

1. Motivation of the student.

Learning is more effective when the student is motivated properly—when he is mentally and physically ready to learn because he knows the reason why he should learn. For example, a dishwashing machine operator who is shown that equipment and utensils must be properly cleaned and sanitized to remove microbiological contamination as well as visible soil is more likely to be motivated to do a good job of dishwashing.

2. Objective of the course.

Learning is more effective when the student knows exactly what he is to learn and what is expected of him. For this reason, the objectives or principles to be taught during this course are listed at the beginning of each lesson plan and lesson manuscript.

3. Participation in the teaching process.

One of the most effective ways of learning is by doing. Active participation by the learner in the teaching process makes the learning experience for the student more vivid and speeds the entire learning process.

4. Realism of the teaching situation.

The more realistic the learning situation, the more effective the learning. Therefore, if the instruction can be combined with on-the-job instruction or presented through a demonstration, the learning is made much more effective.

5. Background of the students.

A student acquires learning only by building upon what he already knows. For this reason, new or technical information should be presented in such a manner that is thoroughly understood by the student. In this course, the information is presented in such a way that the basic need for a food service worker's training course is first explained. The course then builds through the reasons for having high standards of food sanitation, to the procedures that must be employed by the workers to achieve a high degree of food protection.

6. Appreciation of the facts and information taught.

The learning process is not complete until the learner has acquired the attitudes, appreciations, interests, ideals, and habits of conduct that cause him to apply his knowledge in the desired direction to accomplish the goal of maximum food protection. Accordingly, the real goal of this course is to have the food service worker want to apply the principles of food protection at all times he is engaged in any job within a food service operation.

B. Goals of Instruction

The desired outcome of all instruction is student learning. In this case, the food service worker is the "learner." If he is no better equipped to perform the assigned responsibility at the end of a lesson than he was before, no learning has resulted from the instruction. It has been said that "If the student failed to learn, the instructor failed to teach." Therefore, the instructor must accept a major part of the responsibility for student learning and look to himself and his presentation for the cause of failure.

C. Elements of an Instructional Situation

In an instructional situation, there are several elements that must be considered:

1. The instructor.

Probably more than any other single factor, an instructor's attitude toward teaching determines how successful the instruction will be and what kind of a job he does. His attitude will also govern how much satisfaction and enjoyment he receives from his work. An instructor who approaches his instructional assignment determined to do the best possible job of teaching will find teaching a pleasure and will do a good job of teaching.

An important part of an instructor's job is arousing in his students a genuine desire to learn. This involves showing a student that the personal rewards he can receive from learning is worth the effort. In a sense, then, an instructor must be a salesman.

To illustrate the similarity between teaching and selling, a comparison between the four basic steps of each process is shown in Table *A1*.

Although there are many personal qualities desirable for an instructor, there are three that should be mentioned above all others. These are sincerity, enthusiasm, and patience. Insincerity is easily detected by students and causes them to lose confidence in an instructor and lose interest in the entire training program. Lack of instructor enthusiasm will cause even the best planned training program to fall flat and far short of its objective. Patience is needed in any situation, especially when teaching a concept or idea that may be difficult to understand or when the students are not really eager to learn.

Table A1—Four basic steps in teaching and selling

IN TEACHING YOU:	IN SELLING YOU:
Prepare the Group	*Approach the Customer*
Start on time.	Approach promptly.
Put group at ease.	Put customer at ease.
Arouse interest of group.	Awaken customer's interest.
Present Information	*Present Merchandise*
Select material that is suited to the group.	Select merchandise to fit customer's need.
Present no more than can be mastered.	Show one item at a time; do not confuse customer.
Show, illustrate, ask questions, tell.	Demonstrate selling points of merchandise.
Have Group Become Involved	*Have Customers Become Involved*
Stimulate group discussion.	Get merchandise into customer's hands.
Have members demonstrate or use ideas.	Let customer try on or handle merchandise.
Answer questions and correct errors.	Answer questions and meet objections.
Bring Meeting to a Close	*Bring Sale to a Close*
Check on understanding. Ask "why," "when," "where," "how," "what," "who."	Help customer decide; ask "which," "for whom," "when needed."
Be sure group can use information and do the job properly.	Be sure merchandise fits customer's needs and can be used properly.
Summarize main points; make a definite conclusion; close on time.	Summarize good points.
Close session promptly and pleasantly. Make them want more.	Handle mechanics of closing sale promptly and pleasantly.
Pave way for next meeting.	Pave way for customer's return.

2. The student.

In general, the attendees at a food service worker's training program will consist of adult, experienced food industry employees. However, their ages may vary considerably, from persons in their middle teens to those beyond middle age. Also, their educational background as well as the extent of their experience in food establishment work may vary considerably. Although situations may be encountered where the students are uncooperative, it should be presumed that they are eager to learn more about their particular job. They can be strongly motivated by the possibility of learning how to increase their job satisfaction, improve the possibility of promotion, and increase their pay.

3. The teaching process.

The teaching process is composed of several stages, each related to the other.

a. Preparation.

Preparation for instruction should begin as soon as the instructor learns that he will be responsible for a given assignment. It includes both preparing himself to be a better instructor and to present the material in the most advantageous way so the student will gain the maximum amount of knowledge.

When preparing the course material and information for the actual presentation, there are a number of questions that must be answered.

Does the lesson deal with one major topic only?

Are the facts presented meaningfully to the students at this stage of instruction?

Can the ideas or procedures be mastered by the students in the allotted time?

Does the lesson present some new ideas or procedures?

Has the lesson been built on the previous experiences and abilities of the students?

Have the importance of the lesson and the reasons for teaching it been brought out in terms of its significance to the health of the consumer or future job responsibilities of the student?

Is the lesson purpose clearly and concisely stated and is its relationship to the course objective made clear?

Have the steps in the lesson proceeded from the known material or information to the desired objective?

Is the method of presentation selected the one most suitable for the student and for the information to be presented?

Have plans been made for the proper use of training aids?

Have plans been made for class participation in the Lesson?

Is everything in readiness in the classroom?

Each of these questions must be answered in the affirmative before preparation can be considered complete.

b. Presentation.

Actual teaching begins in the second stage of the teaching process, the presentation of the information. The presentation may follow a variety of methods; no single instruction method or device should be used at all times and under all conditions with a given class. This is especially true in teaching adults. Continued uniformity, without change or variety, can only lead to monotony and loss of interest.

Instruction will be most effective when a variety of instructional methods or techniques are used. Consequently, the instructor should be familiar with and be able to use effectively, the several methods available to him to make his job easier and the learning experience more valuable to the student.

(1) The lecture method.

This method consists of telling the facts, principles, theories, or relationships an instructor wants his students to understand; the instructor also gives the directions and explanations orally. Since a lecture is usually a formal discourse on a subject in which the student participates only as a listener, this method should be used only when necessary. Normally the lecture method would be used only when one or more of the following conditions exists.

(a) The class is large.

The size of the class and the size and type of the classroom determine whether the lecture or some other methods should be used. Determining factors are whether students can make their questions heard by the class and whether there can be active participation by a large portion of the class. When questions cannot be heard or only a few can participate, the lecture method is usually employed and participation by the student is secured through practical exercises, demonstrations, examples, and training aids.

(b) When many ideas or a large amount of information must be presented in a short time.

The lecture method must be used when time is too short to allow presentation of all materials by other methods.

(c) Basic or new information is presented.

Lectures are used to present basic facts, principles, or entirely new information needed by the students to provide a common background in the subject.

(d) To prepare for other methods of instruction.

The lecture method is used to give directions for practical work or demonstrations and to get the stage for other methods.

(2) The conference method.

The conference or discussion method allows the greatest amount of student participation. It includes all those activities that tend to develop a flow of ideas and information from instructor to student, from student to instructor, and from student to student. A mutual interchange of experiences and thoughts takes place with the objective being the solution of a problem or the development of a logical conclusion. The instructor acts as moderator or discussion leader. Whenever possible, it is the preferred method.

(3) The demonstration method.

The demonstration or showing method is not a separate teaching method but is used with one or all the other methods. A demonstration shows how something works or how to work something. It accurately portrays procedures and operations. It emphasizes a centering of the student's attention on the actual operation, procedure, or method by which a type of equipment functions.

c. Examination.

"If the instructor has taught, the learner can perform." This widely quoted statement sums up the criteria of good teaching and effective learning. If the student can perform effectively, the teacher has taught effectively and the trainee has learned. Therefore, it follows that a valid test of the learner is an equally valid test of the teacher and should be considered as a part of the overall teaching process.

The objectives of this course involve knowledge, understanding, attitudes and skills. The primary objective of this course is to develop the ability of the food industry employee to perform effectively. In the final analysis, the real test of learning on the part of the employees is how well they perform on their jobs. However, there are several desirable testing procedures and teaching techniques the instructor can and should use in the class to measure learning progress.

(1) Testing in class.

Brief tests may be given from time-to-time to members of the class to measure their progress in learning. Any tests given may be formal or informal, scheduled or incidental. However, it should be part of the overall learning process. The following examples of types of tests will suggest how the instructor may make the in-class testing more effective.

(a) Pre-tests.

Tests can be used for determining the initial standing of class members. At the beginning of a course, an instructor wants to know how much the student already knows of the content of the course. A test covering the entire area of food sanitation given during the first sessions may help the instructor to obtain information about specific points that need to be covered in future sessions. He can then plan his future lessons to cover these points. Also a test of comparable contents given at the end of the course will give the instuctor some idea as to his effectiveness in teaching the class.

(b) Written tests.

The conventional true—false tests can measure knowledge effectively. The multiple choice tests can measure not only knowledge, but also understanding and judgment. Such tests can be given and scored in a very short time. If the scores on the test are unsatisfactory, the instructor should use these tests as a basis of review and re-teaching. Simple true and false tests are included for each session of this course.

(c) Demonstration or performance tests.

A demonstration in which class members participate is a form of testing and is the most effective and most valid test of the knowledge, understanding, and skill of those members performing the demonstration. Moreover, a student demonstration indicates the effectiveness of the teacher's use of the demonstration method of teaching. Since demonstrations are time consuming, it usually is not feasible to have all members of the class participate in each demonstration test.

(d) Oral tests.

Oral test questions enable the instructor to make an effective spot check of student learning and should be made a part of each lesson. The way in which a learner participates in the class, answers questions, and takes part in the discussion is a significant indication to the instructor as to the interest and progress of the learner. In this sense, every session provides many opportunities for the instructor to judge the effectiveness of his teaching and the learning progress of the class members.

Oral tests on an individual basis may also be necessary when class members cannot read or write. Progress in the development of attitudes toward the course, the instructor, fellow students, the job, and the employee will have to be sensed by the instructor. There will be many and varied attitudes that an instructor will quickly sense. As intangible and subjective as attitudes are, their nature will largely condition the success of this course. Consequently, the instructor should use every resource of human relations with the class and with individual members to promote the growth of right attitudes and to motivate the individual to want to practice the principles taught during the course.

d. Application.

It has been repeatedly emphasized people learn to do by doing. This is also the best test of what the food service employee has actually learned. How well does he apply the principles of food protection while doing his job?

Obviously, in the regular sessions, an instructor can have only a portion of the class members show through the use of tryouts and learner demonstrations what that person has learned during the course. He can't reach them all by this means unless the class is very small or the course extends over many hours. Therefore, to determine more adequately if the learner can actually put into practice those principles taught during the course, the performance or application must be observed in an on-the-job situation. For this reason, the follow-up and tryouts on-the-job discussed in Lesson 8 are an integral part of the training program.

e. Evaluation.

All the things an instructor learns about teaching, as well as giving directions and explanations, will be of little value to him unless they contribute to his doing a more effective job of teaching. Anyone interested in doing a better job of teaching will want to know what the problem areas are and how to go about correcting them.

Tables *A2* and *A3*, "Guide for Evaluating Instruction" and "Instructor's Self-Evaluation Sheet," Sheet," may be used by an instructor to pinpoint problem areas. Table *A4*, "Pointers on Becoming a Better Instructor or Discussion Leader," will permit the instructor to review quickly the principles given in this appendix.

Table A2. GUIDE FOR EVALUATING INSTRUCTION [1]

Yes	*No*	
		Introduction
☐	☐	1. Did the instructor establish contact with the class?
☐	☐	2. Was the objective clear?
☐	☐	3. Was the feeling of need created?
		Explanation
☐	☐	4. Was the material well organized?
☐	☐	5. Were the main points emphasized?
☐	☐	6. Did the instruction have continuity between points?
☐	☐	7. Were frequent summaries used?
☐	☐	8. Were illustrations and examples used to vitalize the material?

Table A2. GUIDE FOR EVALUATING INSTRUCTION (Cont'd)

Yes	*No*	Demonstration
☐	☐	9. Were steps of procedure properly emphasized?
☐	☐	10. Was equipment skillfully handled?
☐	☐	11. Were assistants used properly?
☐	☐	12. Were explanation and demonstration coordinated?
☐	☐	13. Were safety precautions and points of difficulty emphasized?
☐	☐	14. Was demonstration summarized?
		Instructor Qualities and Speech Techniques
☐	☐	15. Did the instructor possess poise and confidence?
☐	☐	16. Did the instructor possess good bearing and appearance?
☐	☐	17. Were any distracting mannerisms present?
☐	☐	18. Was the instructor forceful and enthusiastic in his delivery?
☐	☐	19. Did the instructor maintain contact with the class?
☐	☐	20. Did the instructor express his ideas clearly and fluently?
☐	☐	21. Was the phraseology and usage acceptable?
		Use of Training Aids
☐	☐	22. Were the aids used in this lesson adequate?
☐	☐	23. Were they used to the best advantage?
☐	☐	24. Were proper techniques employed?
☐	☐	25. Was blackboard work effective?
		Class Participation
☐	☐	26. Did the instructor properly plan for student participation?
☐	☐	27. Were correct conference techniques employed?
☐	☐	28. Were students given an opportunity to apply the material presented?
☐	☐	29. Were student questions and answers handled with skill?
		Discussion and Critique
☐	☐	30. Were student questions cleared up?
☐	☐	31. Did the summary emphasize the main points of the subject?
☐	☐	32. Was the closing statement effective?
		Preparation
☐	☐	33. Was there evidence of careful planning?
☐	☐	34. Did the general plan for the lesson indicate a sound approach to the subject?
☐	☐	35. Was the best use made of the time available?

---

[1] Usually, this table will be used by a fellow instructor or someone who is a course participant. The table is not designed to be used by the entire class.

The evaluator should briefly explain any "NO" answers to assist the instructor in improving instruction.

Table A3. INSTRUCTOR'S SELF-EVALUATION SHEET

Factors to be evaluated	1	2	3	4
A. Were the physical conditions right? Seating, light, etc.?				
B. Were material and equipment ready?				
C. Did meeting start on time?				
D. Did the meeting show careful advance planning?				
E. Was everyone at ease?				
F. Was the topic presented effectively?				
G. Were the objectives clearly stated?				
H. Was lively interest aroused in the subject?				
I. Were the facts and ideas clearly presented?				
J. Were you skilled in the use of questions?				
K. Was there rather uniform participation by all?				
L. Did you keep the discussion moving on the beam?				
M. Did you refrain from doing an excessive amount of talking?				
N. Did you avoid "experting"?				
O. Did you maintain a friendly attitude throughout?				
P. Were you understandable by all at all times?				
Q. Did you present a good personal appearance?				
R. Were your training aids used effectively?				
S. Did you help group members evaluate ideas?				
T. Did you rephrase thoughts effectively?				
U. Did you get general agreement from group?				
V. Were logical decisions reached, action planned, or the objectives otherwise accomplished?				
W. Did you summarize effectively?				
X. Did the meeting move toward the objective without lagging?				
Y. Did the meeting close on time?				

Place a check mark in column indicating degree of performance of the item. (Let column 4 represent highest performance.) Multiply checks in each column by column value, add these column totals for numerical estimate of performance. A score of 100 represents perfect performance.

Table A4. POINTERS ON BECOMING A BETTER INSTRUCTOR AND DISCUSSION LEADER

I. STAGES OF INSTRUCTION

A. Preparation for Instruction
  1. Estimate the training objective and situation
  2. Select and organize subject matter
  3. Make a lesson plan
  4. Secure and prepare training areas and equipment
  5. Rehearse
  6. Make final check

B. Presentation of Material
  1. Introduction
  2. Explanation
    a. Lecture
    b. Conference
    c. Demonstration
  3. Summary

C. Examination
  1. Oral tests
  2. Written tests
  3. Performance tests
  4. Observation

D. Discussion and Critique
  1. Allow for questions
  2. Review and summarize
  3. Reemphasize important points
  4. Correct errors
  5. Review role of individual in team performance

E. Application or Follow-Up
  1. Individual performance
    a. Supervised individual performance
    b. Group performance
    c. Coach and pupil method
  2. Team performance
    (Show role of individual in team performance)

II. HINTS TO GOOD INSTRUCTION

A. Introduction
  1. Motivation
    Create interest. Make the individual want to learn.
  2. Presentation
    Make the introduction brief, clear, and convincing.
  3. Purpose
    Tell students what is to be learned. Stress importance to individual. Tell them how it is to be used.
  4. Association
    Relate to previous instruction and what is to follow.
  5. Orientation
    Outline the method of presentation. Let the students know what is coming and what is expected of them.

B. Delivery
  1. Attention
    Be sure you have full attention of students before starting.
  2. Volume
    Adjust to the size of your audience. Be sure that you can be heard.
  3. Enunciation
    Speak clearly and distinctly.
  4. Pronunciation
    Pronounce words correctly. Get the "dictionary habit."
  5. Vocabulary
    Avoid use of localisms, slang, profanity, and monotonous connectives (e.g., "Now we'll go into . . ." or "OK, now let's . . ."). Adjust to the level of the students. Define new terms.
  6. Contact
    Look directly at and speak directly to students. Maintain good eye contact.
  7. Excuses
    Prepare yourself; you won't have to make excuses.
  8. Emphasis
    Gain emphasis by forceful presentation, repetition, gestures, pauses, and variations in rate, pitch, and intensity.
  9. Selling the subject
    Convince yourself of its value. The rest is easy.

C. Questions and Answers
  1. Preparation
    Prepare questions and answers to anticipated questions before class. Be sure questions are clear and concise and answers definite.
  2. Type of questions
    Ask specific questions. Each question should

contribute to the instruction. Be certain that each point of the instruction is covered.

3. Phrase the questions
   Phrase your questions to bring out the WHY and HOW and to avoid guess work.
4. Stimulate thinking
   Ask the question. Pause briefly. Call on a student by name for answer.
5. Rotate questioning
   Cover the entire class. Recognize and evaluate student's responses.

D. Summary
1. Frequency
   Summarize frequently as each major point is made. Conclude each period, course, or phase of instruction with a summary.
2. Purpose
   Restate major points.

E. Classroom Management
1. Preparation
   There is no substitute for preparation. Know your subject and lesson plan. Before class, check on seating, lighting, ventilation, instructional materials, equipment, training aids, and assistant instructors.
2. Exercise control
   Remember you are the instructor. Don't let a class get out of hand. Don't argue. Keep lesson moving toward objectives.
3. Timing
   Cover all material. Prepare a schedule and stick to it.
4. Alertness
   Check class reaction continually.
5. Questioning
   Direct questions to inattentive students. Question students frequently to keep class alert and to check their understanding.
6. Problem cases
   Handle problem cases by individual counselling.

F. Demonstration
1. Purpose
   Demonstrate if it will contribute to student learning or understanding.
2. Preparation
   Plan every detail. Train personnel. Rehearse. Follow a written lesson plan. Arrange all tools and equipment properly.
3. Introduction
   Carefully outline the procedure to be followed.
4. Realism
   Make the situation genuine. Use realistic aids.
5. Explanation
   Cover every detail. Demonstrate only one operation at a time. Be sure that each is understood before proceeding. Omit unnecessary information.
6. Safety
   Emphasize factors that contribute to safety.
7. Standards
   Set high standards.
8. Summary
   Review what the demonstration has shown.

G. Application—Practical Exercise or Follow-Up
1. Purpose
   Doing is the most effective form of learning.
2. Introduction
   Carefully outline the procedure to be followed.
3. Standards
   Set high standards. Continue work until they are met. Keep instruction first, production secondary.
4. Supervision
   Observe performance so that you can furnish constructive criticism. Correct errors on the spot. Don't permit practice of incorrect methods. Reteach if necessary.
5. Patience
   Take time to assist students. Things that seem easy to you may not be so to them.
6. Competition
   Develop a competitive spirit to increase interest, motivation, and learning.

H. Examination
1. Frequency
   Use informal testing continuously.
2. Performance
   Check on-the-job performance. Whenever practical, it is the best test of learning.
3. Oral test
   Good for informal testing. Limit oral tests to small groups.
4. Written test
   Test large groups with written tests.

I. Discussion and Critique—A Comprehensive Review of Instruction

1. Purpose
   Bring students to a common understanding, correct errors, point out lessons learned, review principles, and show application.
2. Method
   Review entire procedure and the strong and weak points of performance. Cite examples. Restate the lesson objective. Show what has been accomplished and what it means.
3. Evaluation
   Show strong points and suggest improvements.
4. Frequency
   Review as soon as practicable following other phases of instruction.
5. Location
   Conduct discussion at site of instruction or during follow-up.
6. Preparation
   Know what you are to do. Have location and facilities selected and prepared.
7. Criticism
   Start with good points. Indicate what was wrong and why and how it can be corrected. Make sure it is constructive. Summarize.

III. TRAINING AIDS

A. General

1. Purpose
   Use aids whenever possible. Good aids are essential to instruction.
2. Preparation
   Prepare training aids before class. Be sure they work. Rehearse.
3. Introduction
   Keep aids from sight until needed. Show them at the moment they contribute to the instruction.
4. Visibility
   Display aids where entire class can see. Stand so as not to obstruct view of class. Address the class, not the aids.
5. Simplicity
   Keep simple. An aid to be of value must be simple.
6. Pointer
   Focus attention on specific parts of aid with a pointer.
7. Cover
   Remove or re-cover aids when finished.

B. Slides and Films

1. Selection
   Preview and select film for specific instructional purposes.
2. Introduction
   Prepare students for the film. Tell them what it is about and what to look for. Point out any corrections.
3. Summary
   Review and criticize the film. Show how it applies to instruction.

C. Blackboard

1. Purpose
   Employ blackboard as an effective aid. Keep it as clear, as simple, and as brief as possible.
2. Preparation
   Plan work in advance. Rehearse. Draw complicated illustrations before hand.
3. Chalk
   Use colored chalk for emphasis and contrast. Avoid dark colors.
4. Use pointer
   Use pointer to prevent hiding blackboard. Leave work on long enough for students to take notes.
5. Eraser
   Remove work when finished.

D. Mechanical Aids

1. Simplicity
   Keep simple. Be sure an aid is not complicated so that it will not distract from the instruction.
2. Preparation
   Rehearse. Be sure the mechanical aid will work.

Appendix B. Instructional Aids and Their Use

A. Introduction

Have you ever tried to use words alone to describe the operation of a dishwasher, or how to set a table, how to assemble or disassemble a meat slicer, or any other complicated operation? If you have had this experience, you know that words alone are not enough. Instructional aids can and have been effective in aiding learning. Their effectiveness depends on the instructor's knowledge of their possibilities and how skillfully he uses them.

The effective use of instructional aids is not limited to any one phase of the teaching-learning process. Films, film strips, and slides can be used to add interest as well as to supplement verbal explanations. Group discussions can be made real and interesting by the introduction of pictures, charts, or graphs. Demonstrations can be vitalized by the use of sectionalized units, demonstrators, or class trainers. Individual trainers or actual equipment are invaluable for student try-out performance.

Proper use of films, charts, mock-ups, and other instructional aids saves time, adds interest, helps students learn, and makes the job of training easier. Remember, however, that films, mock-ups, and such must be aids to instruction, not substitutes for instruction. They can give meaning to instruction, but they cannot take the place of good teaching. The instructor who shows a chart or graph without any explanation and the instructor who shows a film without preparing the students for the film are both guilty of not doing their jobs. So use instructional aids to supplement instruction rather than to replace a part of it.

B. Selection of Aids

Advantages are often claimed for certain types of instructional aids on the basis of the sense to which they appeal. Thus, the claim for visual aids is that they are very effective because they appeal to the sense of sight, or an aid is considered more effective if it appeals to two senses rather than one. See Figure B1.

There is definite merit in the suggestion that instruction benefits from appeals to senses other than that of hearing. So select instructional aids to appeal to the sense that is fitting. If you want a student to know what is inside a dishwasher, show him a cut-away dishwasher. If you want to teach a waitress how to take an order, let her listen to an experienced waitress take an order. If you want a chef to know how to identify the odor of spoiled food, let him smell a sample of food that has spoiled. If you want to demonstrate the presence of bacteria on a food contact surface, show him a culture taken from that surface. But instructional aids should be chosen to fit the learning situation rather than on the basis of the sense to which they appeal.

1. Categories of training aids.

Most available training aids fall into one of the following categories:

a. Operational equipment used for training purposes.

b. Training films, film strips, slides, and associated projection equipment used for training purposes.

c. Training graphics (diagrams and schematic drawings, reproductions, pictorial drawings, paintings, photographs, transparencies, and any supporting texts used for instructional purposes).

d. The blackboard.

e. Training devices (mock-ups, demonstrators, simulators, and synthetic trainers.

The instructor may find that one or more of these tailormade training aids are available and suitable. He may need only to select the proper one and put it to use. A selected list of sources of training aids for food service training programs may be found on page 116.

Whenever actual objects and equipment can be obtained that are suitable in size and detail, they should be used. Dishwashing machines and food preparation equipment, such as slicers and grinders, are ideal for making instruction realistic. However, it may become necessary to develop or improvise instructional aids. When this is the case, consideration should be given to the following criteria.

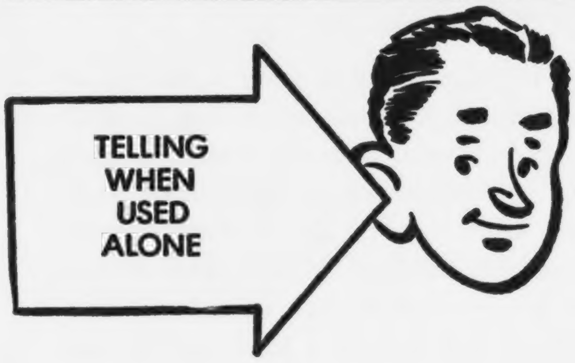
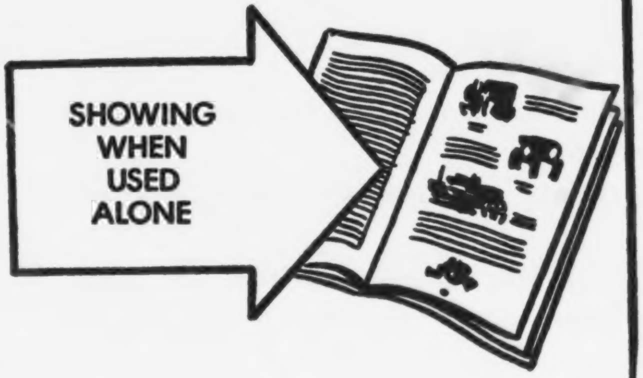
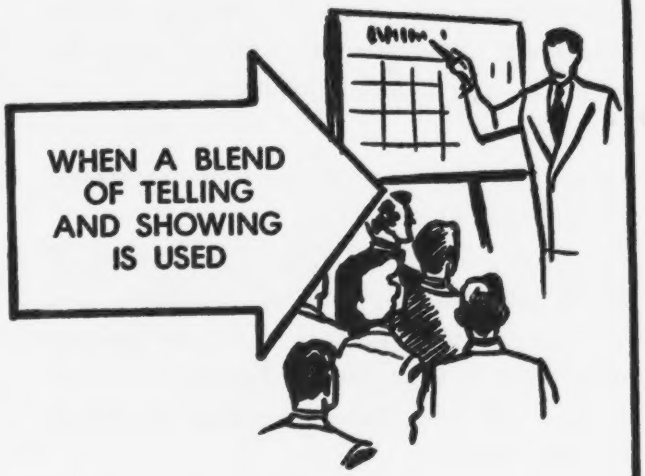
METHODS OF INSTRUCTION	RECALL 3 HOURS LATER	RECALL 3 DAYS LATER
 TELLING WHEN USED ALONE	70%	10%
 SHOWING WHEN USED ALONE	72%	20%
 WHEN A BLEND OF TELLING AND SHOWING IS USED	85%	65%

Figure B1. Some methods of instruction and the results which may be expected from each.

2. Characteristics of good instructional aids.

a. The aid should be a convincing representation of the actual object. Inaccuracies or poor representations lead to misunderstandings.

b. The aid must be of a size suitable for teaching. It should be visible to all students in the teaching situation for which it is designed. Each detail should be clearly represented.

c. There should be provision for storage or protection of the aid when not used.

d. The aid should be simple and easy to use or manipulate. Training aids that require a great deal of manipulation or complicated explanations are of little value unless they simulate actual conditions.

C. Films and Film Strips

Training films can aid in clarifying directions and explanations. The tendency of viewers of movies to "identify" themselves with the actors and actions make these experiences more real. They bring to the student activities which could not otherwise be observed. You cannot show the student the dividing of a microorganism in the classroom, but training films can vividly illustrate this event. Films also have the advantage of showing detailed operations in a clear, simple way. The use of slow motion, animation, and other techniques make films adaptable to many purposes.

When a person goes to a movie at the local theater, his primary purpose is to be entertained. Although training films have some of the features of entertainment, their main purpose is instruction. They must fit into the overall training activities. Careful planning is necessary if films are to add to the student's understanding of how to do a job. There are a number of important steps to take before the film or film strip can be made a part of teaching.

1. Choose the film or film strip carefully.

A training film is chosen primarily for its value in explaining the job to be done or in giving directions on how to do the job. Therefore, it must be simple enough for the students to understand. The instructor should ask himself, "Does it show the idea clearly?"

2. Preview the film or film strip.

The instructor must be ready to answer student questions and clear up any misconceptions. He should select the most significant ideas so they can be highlighted and emphasized. He should make a check list of important points to bring to the attention of the students. He should also plan the oral explanations to be given with each frame of a film strip.

3. Prepare for the showing of the film.

The time required and the facilities for showing the film should be checked. Introductory explanations should also be prepared.

The students should be alerted to the important points in the film to arouse their desire to see the film. They should be told what they can learn by seeing the film. In this way, the instructor prepares the students to pick out the features, directions, and explanations that will do them the most good.

4. Show the film or film strip.

In most cases, showing a film calls for little or no active participation on the instructor's part. However, he may want to call the student's attention to a particularly significant point in the film. A statement such as, "Now watch this next operation carefully", will alert students to important parts. A rerun of parts of the film may be valuable in emphasizing certain points.

Showing film strips may require more activity on the part of the instructor since they frequently have neither sound nor provision for automatic advancement of the film. In these cases, someone else should operate the projector so the instructor can stand before the class. As each frame is projected, the instructor adds whatever explanations are necessary for clarification. A pointer or a flashlight that projects an arrow of light is valuable to pick out important features of each picture. Explanations are necessary, but avoid lengthy sessions with film strips. The relative inactivity on the part of the student can quickly lead to boredom.

The main point to remember in showing film or film strips is "Don't just let them see it. Show it to them."

5. Check effectiveness of a film.

To determine whether a film has been effective or not, it is well to plan a check-up following the showing. Carry it out as soon as possible after the film is shown.

There are several ways this can be done. Prepare a brief paper-pencil test to determine whether students understand what they have seen. A class discussion is often useful in clarifying misconceptions students may have received.

There are three significant directions to follow in the use of this type of aid: PLAN IT. SHOW IT. CHECK IT.

D. Other Aids That Utilize Projectors

Projected aids other than films or film strips can also be effectively used. In some instances, they are preferable to films or film strips. In a measure, all projected aids answer the important challenge your students give you. "Show me a picture of it."

1. Thirty-five millimeter, 2 x 2 slides

Thirty-five millimeter slides are similar to film strips in that a single picture or image is projected onto a screen and permitted to remain there for as long or as short a period as is necessary to explain the salient points or to illustrate the spoken word. However, 2 x 2 slides have an advantage in that the sequence of pictures may be conveniently arranged to suit the individual instructor's need. Further, new or updated slides may be added easily and old or outdated ones deleted as the occasion may dictate.

Another definite advantage of slides is that they are relatively inexpensive. They can be produced locally to illustrate actual situations or conditions being discussed. In this manner, the instructor may be able to place the student in a recognizable situation, and, thereby, make the learning experience more meaningful.

The obvious disadvantages of the projected slide is its lack of motion and sound. The lack of motion can be partially compensated for through a series of pictures that represent various stages in the development of an action or actions, or by semianimation through the use of polarizing techniques. The lack of sound can be compensated for by the spoken word of the instructor or an automatic projector with a synchronized sound tape.

2. Overhead projectors

The use of the overhead projector as a training aid has become more widespread as the equipment has become more readily available and more portable. There are a number of reasons why this type of projector is a valuable aid in teaching.

a. The construction of the projector permits it to be placed close to the screen and, thereby, makes it possible to project slides from the front of the room.

b. The instructor faces his audience at all times since the image is projected over his shoulder.

c. A high light output provides excellent screen visibility without darkening the room or impairing ventilation.

d. The audience is in full view, and the instructor is able to observe their reaction at all times and adjust his program to meet response of the viewers.

e. The sequence of slides may be easily altered, or slides already shown may be projected again, as the occasion may dictate.

f. The large horizontal projection stage permits the instructor to use the screen as a "blackboard" since he may write or draw on the slides or on sheets of transparent plastic, such as a sheet of clear x-ray film. He may also use a pointer or a pencil to point out important details of a slide.

g. Several slides or sheets of film may be superimposed; this permits the message on the slide to be added in single elements or sections as needed.

h. Slides are large, usually 8 x 10 inches in size, which simplifies the preparation of art work. Even rudimentary art skills can produce dramatic, colorful, professional looking slides.

E. Training Graphics

Many pertinent facts, directions, and procedures in a teaching-learning situation can be presented by means of charts and diagrams. In addition, charts and diagrams have the feature of being readily available for additional student and instructor reference.

Charts and diagrams need not be elaborate displays. They can be drawn on any material, including paper, wallboard, cloth, plastic, and blackboard. The most important consideration is to select charts that are understandable by the students.

Don't select charts that present more concepts on them than the student can understand in a short period of time. Charts that show too many steps in a process should be broken up into a series of charts that show a little at a time.

Choose graphics that use color in emphasizing important features whenever possible. Choose the ones that are well balanced and center on one main theme.

When selecting a chart or diagram to present a concept or new idea, the instructor must be sure that he understands the chart himself. This seems obvious, but many an instructor has been tripped up by a chart he didn't know how to use.

Make best use of graphics by adding oral descriptions and explanations. Plan their use and fit them into both the lesson plan and the lesson.

Store all charts not being used where students cannot see them. Additional charts merely distract their attention. There are times, however, when several charts may be used together, especially when they are closely related or if one shows a simplified part of another.

Let all students see the charts used. Stand beside them, not in front of them. Use a pointer! Talk to the student!

F. The Blackboard

Let the chalk talk. Many a blackboard has shed light on a difficult subject. The blackboard is one of the most flexible and useful training aids available, but, it is also highly misused because instructors sometimes fail to understand its potential or lack understanding of some simple techniques in its use.

An instructor can develop desirable blackboard techniques and make effective use of the blackboard by following these suggestions:

Use letters and figures large enough for all students to see.

Let students see what is on the blackboard by standing to one side and explaining it to them.

Erase all material not needed by the instructor or the students.

Let all students see the material before it is erased.

Use colored chalk, but use it for emphasis, not for beauty.

Keep the work neat, clear, and orderly.

Many instructors misuse the blackboard because of lack of practice. An instructor who spends a few hours by himself practicing some of these simple techniques will greatly improve his teaching ability. After putting drawings and tables on the board, the instructor should back away from it, in the place of the student, and ask, "Has that instructor done a good job of writing and drawing on the board?"

Remember that the blackboard has great value in developing relationships and in showing organization, especially to illustrate a complicated diagram, schematic, or equipment. Simplified parts of the schematic or equipment can be sketched on the board. In this way, they can be more easily explained and the relationships to each other and to the whole item can be more readily developed.

Students, too, can make effective use of blackboards. For review purposes, student drawings and explanations on the blackboard will help in clarifying misconceptions and reviewing procedures. In some instances, you can effectively use all of your students at the board to do problems or draw important diagrams. It furnishes a quick and easy method of checking each student for difficulties he is encountering in understanding directions and explanations.

G. Training Devices

A realistic training situation aids a student to perform in his future assignment. If an instructor can duplicate typical on-the-job conditions in the teaching-learning situation, his students will have only a minor problem in adjusting themselves to the actual on-the-job conditions.

It may be possible for the instructor to develop a training device for his particular training situation. To be effective, it need not be elaborate. If it promotes student development more efficiently by making the learning environment resemble actual operating conditions, it is an effective training device.

H. Training Literature

An author of a book may have a better way of presenting explanations than the instructor. After all, he can take hours or days to plan a good presentation. If there is a manual or other reference that presents a concept in a clear, concise manner, don't hesitate to use it. Sometimes a good author can do more than the instructor to develop insight and understanding on the part of the students.

Each of the training aids previously mentioned usually has a very definite place in the varied training situations encountered in this course. Consideration of the special features of each will help the instructor select the proper aid in his own teaching-learning situations.

I. Use Training Aids Effectively

In the use of training aids, make complete plans and preparation so that the aid will relate to directions and explanations being given. Unless an aid contributes to the development of student understanding and mastery, it is of little value in a training program.

Understand the aid completely before using it. Make it "fit in" with the presentation. Plan its use so that the instruction will be more effective.

An instructor should keep in mind at all times that everything he does should be an aid to student learning. Those things that help students understand more clearly should be used when and where they will be most effective.

An instructional aid to be of value must be used to help student development. If the particular aid is of no value in that respect, the instructor is wasting time if he uses it. However, before deciding that an aid is of no value, be sure that it is being used for the purpose it was designed and built. Above all, don't expect the aid to do all the teaching. Aids are provided to help, not replace, the instructor in achieving student development.

Training aids require a transfer of learning. The student must connect the training aid with reality and must develop the ability to apply what he has learned to the actual job. In some cases, this is true of actual equipment. Naturally, the less the aid resembles the real thing, the greater the problem of transfer and the greater the instructor's responsibility in making sure that the student sees the connection and makes the transfer.

Remember, too, that new or improved training aids are always needed. There may be specialists to develop these training aids, but the instructor is in the best position to detect and understand the need for them. Every difficult part of instruction is a challenge to develop a new training aid or improve an existing aid. Start thinking along these lines and discuss your ideas with other instructors or your supervisor.

J. Sources of Instructional and Training Aids

Although there are many training aids available for use in food service training programs, the source of such aids is not always known by those persons responsible for planning, developing, and presenting such programs. A partial list of governmental agencies and other sources where training aids may be obtained. Frequently, there is no charge except postage and many of the sources listed have catalogs that list and describe the material. You may want to request these catalogs as reference sources.

1. Federal government:
   a. Department of Health, Education, and Welfare
      (1) U.S. Public Health Service

Environmental Control Administration
Bureau of Community Environmental Management
Division of Food, Milk and Interstate Travel Sanitation
Cincinnati, Ohio 45202

National Communicable Disease Center
Public Health Service Audiovisual Facility
Atlanta, Georgia 30323

U.S. Public Health Service Regional Offices
Attn: Regional Environmental Control Directors

Region I
John F. Kennedy Federal Building
Government Center
Boston, Massachusetts 02203
Serving—Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont

Region II
Federal Building
26 Federal Plaza
New York, New York 10007
Serving—Delaware, New Jersey, New York, Pennsylvania

Region III
220 7th Street, N.E.
Charlottesville, Virginia 22901
Serving—Kentucky, Maryland, North Carolina, Virginia, West Virginia, District of Columbia, Puerto Rico, and Virgin Islands

Region IV
Room 404
50 Seventh Street, N.E.
Atlanta, Georgia 30323
Serving—Alabama, Florida, Georgia, Mississippi, South Carolina, Tennessee

Region V
Room 712, New Post Office Building
433 West Van Buren Street
Chicago, Illinois 60607
Serving—Illinois, Indiana, Michigan, Ohio and Wisconsin

Region VI
Federal Office Building
601 East 12th Street
Kansas City, Missouri 64106
Serving—Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota

Region VII
1114 Commerce Street, Ninth Floor
Dallas, Texas 75202
Serving—Arkansas, Louisiana, New Mexico, Oklahoma, Texas

Region VIII
9017 Federal Office Building
19th and Stout Streets
Denver, Colorado 80202
Serving—Colorado, Idaho, Montana, Utah, Wyoming

Region IX
Federal Office Building
50 Fulton Street
San Francisco, California 94102
Serving—Alaska, Arizona, California, Hawaii, Nevada, Oregon, Washington, Guam, American Samoa

(2) Food and Drug Administration
Bureau of Compliance
Washington, D.C. 20204

(3) Office of Education
Bureau of Adult and Vocational Education
Washington, D.C. 20201

b. Department of Defense

Certain films and training aids may be available from Army and/or Navy Training Aid Section Libraries and Depots on a loan basis to the medical profession, allied scientific groups, and certain nonprofit organizations. Eligibility for receiving these training aids may, in each case, be determined by directing an inquiry to the appropriate address in the Army area or Naval District in which the requesting activity or individual is located.

(1) Department of the Army

Requests for films from the Department of the Army Film Libraries should be addressed to the Commanding General (appropriate Army area), Attention: Audiovisual Support Center. Following is a list of the various Army areas and the States in each area.

First Army
Fort Meade, Maryland 20755
States: Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Ohio, Pennsylvania, Virginia, West Virginia, Maryland, Kentucky, Delaware, District of Columbia

Third Army
Fort McPherson, Georgia 30330
States: Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi

Fourth Army
Fort Sam Houston, Texas 78234
States: Texas, New Mexico, Oklahoma, Arkansas, Louisiana

Fifth Army
Fort Sheridan, Illinois 60037
States: Illinois, North Dakota, South Dakota, Minnesota, Iowa, Wisconsin, Michigan, Wyoming, Nebraska, Colorado, Kansas, Indiana, Missouri

Sixth Army
Presidio of San Francisco 94129
States: California, Washington, Montana, Idaho, Oregon, Nevada, Utah, Arizona

(2) Department of the Navy

Requests for films from the Department of the Navy should be addressed to the Commandant (appropriate Naval District), Attention: Director of Training. Following is a list of the various Naval Districts and the States in each District.

First Naval District
495 Summer Street
Training Aids Section
Boston, Massachusetts 02110
States: Maine, Vermont, Massachusetts, Rhode Island, and New Hampshire

Third Naval District
Training Aids Center
East Coast
Federal Office Building
3rd Avenue and 29th Street
Brooklyn, New York 11232
States: Connecticut, New York, New Jersey (Northern)

Fourth Naval District
Training Aids Section
Building 4
U.S. Naval Base
Philadelphia, Pennsylvania 19112
States: Pennsylvania, New Jersey (Southern), Delaware, Ohio

Fifth Naval District
Training Aids Section
Building No. 199
U.S. Naval Station
Norfolk, Virginia 23511
States: Maryland, West Virginia, Virginia, Kentucky

Sixth Naval District
Training Aids Section
Building 1193
U.S. Naval Base
Charleston, South Carolina 29408
States: North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee, Mississippi

Eighth Naval District
Training Aids Section
Building No. 229
U.S. Naval Station
New Orleans, Louisiana 70140
States: Louisiana, Arkansas, Oklahoma, Texas, New Mexico

Ninth Naval District
Training Aids Section
U.S. Naval Training Center
Great Lakes, Illinois 60038
States: Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Wyoming, Kansas, Colorado

Eleventh Naval District
U.S. Naval Training Aids Facility
Fleet Station Post Office
San Diego, California 92130
States: Arizona, Nevada (Southern tip), California (Southern)

Twelfth Naval District
Training Aids Center
West Coast
Building No. 62
Treasure Island
San Francisco, California 94130
States: Utah, Nevada, California (Northern)

Thirteenth Naval District
Training Aids Section
U.S. Naval Air Station
Seattle, Washington 98115
States: Washington, Oregon, Idaho, Montana

Fourteenth Naval District
Training Aids Library
Navy No. 128
C/O FPO
San Francisco, California
States: Hawaiian Islands, and islands to the westward and southward

Naval District, Washington, D.C.
Training Aids Section
Washington Navy Yard
Washington, D.C. 20390

2. Nongovernmental

a. National Restaurant Association
Educational Materials Center
1530 North Lake Shore Drive
Chicago, Illinois 60610

b. National Automatic Merchandising Association
7 South Dearborn Street
Chicago, Illinois 60603

c. National Dairy Council
111 North Canal Street
Chicago, Illinois 60606

d. Public Health Committee
Plate, Cup, Container & Doily Institute, Inc.
Two-Fifty Park Avenue
New York, New York 10017

e. Diary and Food Industry Supply Association
1145 19th Street, N.E.
Washington, D.C. 20036

f. National Sanitation Foundation
Post Office Box 1468
Ann Arbor, Michigan 48106

Appendix C. Organizing and Promoting A Food Service Employees Training Program

A. Introduction

Experience has demonstrated the practicability and effectiveness of food protection training courses. Through educational means, the reasons for food protection laws and regulations may be explained so that acceptance for them is gained. The courses are usually well received, and their repetition has been requested. Improvements in sanitation that have followed such courses indicate that education usually can bring more lasting results than policing. Court action has frequently been avoided, because the well-informed worker is apt to carry on his work according to the training he has received. Where cooperation has been enlisted, enforcement agencies have had less difficulty in carrying out their work.

Routine inspection should be coupled with education to serve as a reminder of the need to use correct practices. There is still a place for enforcement through policing, for penalties are still the only cogent means of gaining compliance where cooperation is lacking.

The Public Health Service recommends, as a supplement to thorough inspection and uniform enforcement, that all health departments conducting food protection programs hold training courses for persons working in food and drink establishments.

Since primary responsibility for training food service workers belongs to the management of individual establishments, it is especially important that managerial and supervisory personnel be trained in the principles of food protection and sanitation. Every effort should be made to encourage and assist management in accepting that responsibility because complete training cannot be done in a classroom or without the support of management.

B. Tips on Promoting a Training Program

1. Who Initiates a Course in Restaurant Sanitation.

In the past, food protection traning courses have most often been given by a health department. However, courses in food protection may be presented by either a public or private agency and there are a number of approaches that can be used to have the course presented.

a. A course can be given by local high schools, technical institutes or university extension programs utilizing existing trained personnel in these institutions.

b. A course can be sponsored; the sponsoring group may be a trade association such as the local restaurant association, a union, a professional association, *i.e.*, sanitarian's organization, Chamber of Commerce, or similar group with material content coordinated by the regulatory agency to ensure adequate coverage.

c. A series of "crash" programs can be held by trained people at key locations to teach others, who in turn conduct training programs.

d. A combination of these approaches may be employed.

C. How to Start the Ball Rolling

The success of a food protection training course is decided far in advance of the date it begins. Unless a course is carefully planned, it will fail to accomplish its purpose. The first step is to set up a planning committee consisting of members of the health department, representatives of the restaurant group concerned, and perhaps representatives of leading civic groups. Where groups such as Community Health Councils exist to deal with health and related community problems, they may be encouraged to promote the course.

Thus, use is made of initiative that already exists, and the leadership group learns, in considerable detail, about this important service of the health department.

1. Health Department's Role on the Planning Committee.

The health department either retains control of the courses since they tie in with one of its duties (enforcement of State and local health regulations) or acts in an advisory capacity and supplies members of its staff as consultants and speakers. The training of food service workers is an excellent means of contact between the department and the public. It demonstrates a phase of its work that affects the health of a large proportion of the taxpayers. It builds up a sympathetic interest in other health department activities. Also, it is important to "sell" this work to the official representatives of the public, such as the mayor and the city council, since they have entrusted the department with enforcing the local restaurant code.

Although the sanitarian may originate the course, develop concrete plans on his own initiative, and be prepared to conduct it, he taps the health department as a whole for ideas and assistance. The health officer, the public health nurse, the health educator, and others can do much toward the success of the program by assisting in decisions on the following:

A "total education" program of food protection courses for the year.

The content of the courses.

Persons who will assist in their presentation.

Ways to promote public interest in the program.

The agenda of a promotional meeting with operators and managers, and the choice of persons who will officiate at that meeting.

Organizations that may serve as cosponsors of a program.

Publicity and printing.

Funds that may be needed and where they may be obtained.

When a representative community organization initiates a program, it has the same decisions to make. Its chairman discusses plans with the sanitarian and, if one is available, with the health educator. The sanitarian serves as technical consultant throughout.

2. Food Service Industry Role as a Planning Committee.

Persons in the food service industry or those, such as trade associations, who are vitally concerned with it are the backbone of the program. Without their cooperation and support, the training course cannot be completely successful.

When there is a restaurant or tavern operator's association, the health officer or the sanitarian may ask to appear before it to talk about problems that have become evident during routine inspection. He may enlist their assistance in planning and sponsoring a training course. If they move to sponsor one, preliminary plans should be discussed at once. The managers do not always have to be sold on the course; many appreciate its benefits and ask for it.

On a planning committee, managers indicate their interests and assist in defining special problems and in guiding the course content to help solve those problems.

In talking to restaurant men and women, the fact should be stressed that in the majority of cases equipment is secondary. Correct methods and procedures are more important. They should be reminded that, other things being equal, business is better and personnel problems fewer when healthy workers follow approved practices of preparing and serving good food.

The thinking of employees, as well as that of employers, should be considered. In addition to learning pertinent facts about their sanitation problems from employees on the job, the participation of employee representatives in the planning conference should be encouraged. Frequently this participation is achieved through unions. Certainly, the support of unions may well be enlisted to endorse ideas and to promote class attendance. The courses, it should be explained, are educational. They develop in-job techniques that aid in preventing the spread of disease in restaurants. They emphasize the maintenance of sanitary working conditions, instruct the worker in basic principles for protecting his own health, and point out his responsibility in regard to the health of his fellow workers and of his customers.

3. Role of Community Groups on a Planning Committee.

Prominent community groups such as the Chamber of Commerce, Junior Chamber of Commerce, or the Community Health Council can frequently be enlisted to cosponsor the basic series of courses and may support the program in a number of ways, some of which are listed below.

Helping to arrange for a meeting place.

Securing introductory speakers.

Providing funds, if needed, as for printing.

Securing publicity, especially in the press and on the radio.

Bringing the attitude of the public to the attention of the restaurant men.

Providing voluntary help, as registrars.

Sending letters to all eating establishments jointly with the health department; urging attendance of personnel and enclosing a copy of the class schedule.

Arousing community interest in the program.

Expressing more general community backing and goodwill.

Prompting owners and operators to take a more active part.

Lending prestige.

Probably the most effective cosponsors are those whose goodwill a restaurant needs. However, they should not merely lend their name to the cause, but should be influential in getting action.

Such a group may be approached in several ways. The sanitarian may meet with it throughout the year; he may develop casual day-by-day contacts with its members; he may ask to appear on a club program to explain sanitation needs and what the health department recommends doing about them. Or another member of the health department, because of previous relations with a desired sponsor, may be delegated to approach it.

As a byproduct of service as cosponsors, community groups learn to appreciate and understand the importance of improved restaurant sanitation and, consequently, come to demand and expect higher quality food service establishments. In short, participation becomes a learning experience for the representatives of the people.

4. Spade Work or How to Assure a Successful Training Program.

The health department, before proposing a course, should carefully consider tentative plans in its own staff meetings. It should be ready to deliver whatever it proposes to do, both in administrative matters and in lesson content.

Before attempting to promote the interest of restaurant men in the presentation of a program, the following questions must be answered. They are details of administration, representing some of the spade work that must be satisfactorily accomplished if the courses are to succeed:

a. Who should attend the courses?

As many as possible of the employees of all food and drink establishments should attend. It is desirable that a representative from the owner-management group of the establishments also attend a course to find out exactly what his staff is learning and should be supported in doing in the future. When no other arrangement is practical, one representative from each establishment should attend; he should be informed regarding correct practices and should be held responsible for proper sanitation in his establishment. Invitations should be extended to students and instructors of home economics classes; to supervisors of school lunchrooms; and to dietitians in hospitals, industrial cafeterias, and institutions. Certain others may be asked to visit, particularly local officials, representatives of the civic sponsor and unions, and housewives, especially those who arrange and supervise occasional food service operations such as church suppers or promotional dinners.

b. How is good attendance developed?

Primarily, good attendance is stimulated through sound instruction. Other factors that should be considered are fostering encouragement and cooperation from management and making known the results of a sanitary survey showing a need for improved restaurant sanitation.

c. Where will the course be held?

Detailed information can be found in Part 11 of this guide.

d. What should be the basis of attendance?

Whether attendance be voluntary or compulsory depends upon local conditions. It is usually wise to develop the first program, at least, on a voluntary basis. After a majority of workers in the area has been trained, employers may insist that remaining employees receive training; thus a program may become compulsory because of its success. In communities able to maintain continuation courses, attendance may be made mandatory by enactment of legislation, or by regulations issued by the health officer or board of health when such powers are delegated.

If compulsory attendance is being considered, courses must be set up so that the workers can readily meet attendance requirements. Where courses have not been held, a temporary permit should be issued to cover a period long enough to give each person ample opportunity to attend all classes. On completion of the course, the worker should receive an attendance certificate. Similarly, it is practical to accept a new worker without training, with the understanding that he will attend and complete the course within a given time.

NO PROGRAM, STATIC IN NATURE, CAN CONTINUE TO MEET TRAINING REQUIREMENTS. THIS MEANS THAT THE PLANNING COMMITTEE SHOULD PROVIDE FOR REFRESHER COURSES AND CHANGES IN COURSE CONTENT CONSISTENT WITH OVERALL PROGRAM NEEDS.

e. How many should attend?

Small classes are recommended. Classes of several hundred have been held, but a meeting of a hundred or more cannot solve the training problem satisfactorily. Relatively small groups are usually more conducive to learning since they receive more individual instruction; but after continuation courses have been in operation for a year or so, a course for a large group helps to raise the peak of interest. The reduction of large groups into smaller units is sometimes made according to the size of the restaurants from which the workers come or the equipment with which they work. Dividing large groups into smaller problem-solving groups who report to the entire group is an effective way to promote and maintain interest in the course.

The approximate, if not the exact, attendance should be determined by advance registration. It may be necessary to sign up each worker when on inspection rounds or to get the count on a return postcard sent to the employer. At the promotion meeting, a final check on the tentative number may be secured.

f. How often should classes be held?

The presentation of one course will not be adequate. An educational program should be planned for a year, to be followed by another program the following year. Once a year may be often enough for the general survey type of class, but the frequency with which smaller units are called for continuation or refresher courses depends on:

The rate of turnover of workers.

The total number of workers, since there must be enough classes to give all a chance to attend.

The staff available for giving course.

The survey ratings of food establishments to determine existing sanitary conditions and to provide yardsticks for measuring need for improvement.

g. At what hours should classes meet?

Classes must meet at a time convenient for both management and workers so that routine duties are not interrupted. This is especially important when attendance is compulsory. Consideration should be given to establishments or operations that are open all day and all night, those operating in department stores and variety stores, and so on. The sanitarian may "sound out" managers as to when meetings will be most convenient to the largest number, the number that can come at those times, and other factors. Two weeks is a reasonable time for such a study. In some communities the sanitarian sends out a letter with a return postcard for desired information. As a rule, the hours found most satisfactory are: 9:30 to 11; 2:30 to 4; 3 to 4:30; or 7 to 8:30. However, the convenience of the persons concerned must decide the time.

h. How long should classes run, and how many classes should be held?

Although it has been stated that attention begins to wander after the first 20 minutes, an exceptionally well-planned and executed class program can hold student interest for as long as 2 hours. The length depends on several factors, such as the time for which the meeting place is available and the preference of the majority of the food establishments. Classes usually run from 1 to 2 hours.

The number of classes will have to be decided locally. Usually the most satisfactory arrangement is to have three classes meeting for 1½ hours each. Four classes meeting for 1 hour each make a feasible schedule if workers cannot be spared for a longer period at one time. Two classes of 2 hours each are less desirable but, from some standpoints, are workable. Longer classes are not recommended.

Sessions are usually held on consecutive days. Too long an interval between them might interrupt continuity. Also, rapid turnover of workers might prevent completion of a course by some.

i. How are attendance records kept?

A practical system of registering and checking attendance is vital. Preregistration may be advisable but is not always practicable. In any event, sufficient registrars must be available to handle the number expected, to explain the registration and the check-in system, and to keep the line moving. A suitable system for keeping registration and attendance records becomes the basis for the award of certificates.

j. What plans should be made for the certification of workers?

It is usually desirable to award those attending the course a certificate showing that they have satisfactorily completed a food service sanitation training course. What constitutes satisfactory completion may vary according to the type of course given but is usually dependent upon attending a specified number of sessions, say 6 out of 8 sessions or at least 75% of all sessions when a lesser number is given. The satisfactory completion of a written test may also be considered part of the requirement.

k. Will the establishments whose employees participate in the training course receive recognition?

Each establishment, as well as its workers, should receive recognition for cooperation. The greatest form of recognition is that received from customers who compliment the management on improved sanitation or service.

However, it may be desirable for the health department to award the establishment a placard stating the percentage of employees (for example, 70 or 80%) who attended. A placard should be awarded only if the establishment is operated in accordance with all other health regulations. In case of later violation of local ordinances, it must be removed.

l. What visual education aids and equipment and other materials will be used?

Many forms of visual aids and visual aid equipment may be used. Following is a partial list of visual aid equipment that may be used, and the person in charge of the course should know how to set up and operate each piece.

35mm Slide Projector.
16mm Movie Projector.
Overhead Projector.
Projection Screen - 60" × 60" (minimum).
Tape recorder.
Flip chart.
Chalkboard or blackboard.
Flannel board or Velcro board.
Exhibit posters.
Demonstration material.
Pamphlets and leaflets.

m. Who will conduct the classes?

A staff can be organized to give the courses, depending in part on the frequency of repetition of the classes and the public-speaking ability and showmanship of instructors available. The staff may consist of the health officer, sanitarian, nurse, and health educator. Through repetition of the course, their techniques of instruction and ability to hold interest will improve—training that will be lost if different groups of instructors officiate each time the course is presented.

n. What other people are available and how may their abilities be incorporated?

Some State health departments have special staffs available to assist in organizing and conducting classes; they can lend visual aid materials and necessary equipment. Reciprocal intercounty arrangements are often helpful in securing equipment, speakers, and resource materials. In addition to consultants at local, county, and State levels, others are available at the regional offices of the U.S. Public Health Service. The latter are in a position to present demonstration courses for interested health departments. The sanitarian who is conducting a course may call on another sanitarian or sanitary engineer to assist him. Persons in related fields can give invaluable aid: private physicians, health officers, public health nurses, health educators, nutritionists, dietitians, home economics teachers, home demonstration agents, county agents, vocational education teachers, rat-control specialists, the coordinator of distributive education where the U.S. Office of Education has established such a program. Restaurant owners and operators may be called on to assist; workers often help demonstrate, model, and take part in dramatic sketches; art teachers and manual arts teachers frequently contribute posters and exhibit materials.

o. How may public interest be stimulated?

It is important to recognize and capitalize on the tremendous public interest in food service establishment sanitation. Suitable publicity will stimulate attendance, create public appreciation toward participating workers and employers, and arouse favorable interest in the work of the health departments. It is advisable to invite representatives of the press and radio to the owners' and operators' meeting and also to the classes. If properly approached and consulted, they will be very helpful in working out an excellent schedule of publicity for the entire program with the health department. By and large, better publicity will be obtained when reporters write their own stories, but they should be supplied with a fact sheet adapted to the local situation. This fact sheet may be the basis for news stories, editorials, and feature articles. Radio stations and newspapers can be supplied from day to day with additional material for spot announcements and fresh copy, including names of cooperating restaurants and cosponsors, with comments on the projected course by local restaurant operators, and, finally, comments on the completed course. The press should be given the list of restaurants getting placards (in a small community even a list of persons getting attendance certificates) with an explanation of the placards, possibly an article explaining the fundamentals of restaurant sanitation, and pictures of the class in session. In working out the publicity schedule with the press, the idea might be incorporated that homemakers can check their own practices while cafes and restaurants are improving theirs. Spot radio and TV announcements may be made before the course begins. Local stations can develop three-way interviews, quiz programs, or sketches featuring representatives of the health department, the restaurants (manager or employee or both), and the public.

In some communities, the mayor proclaims the week during which a survey course is given as "Restaurant Week".

Exhibits of various kinds are also helpful. Restaurant windows may display posters advising patrons that the workers and operators are cooperating in a program for learning and maintaining high standards and safe practices in restaurant service. The restaurant association arranges for local merchants or utilities to decorate windows with posters, dishwashing equipment, or uniforms for different workers; or they may be encouraged to set up a kitchen, dishwashing, or serving scene. Posters may be used to remind workers of the meetings.

D. Follow-up or How to Maintain a Good Food Protection Program

After the course, the first obligation is to send letters of appreciation to the sponsors; to hotels or organizations that made the meeting place available; to the operators, the press and radio stations; and to all who contributed time or money toward making the program a success. Opportunity should be given the restaurants to criticize the course and to indicate what they found helpful, what needs strengthening, and what might be omitted.

It must be remembered that one course alone is not sufficient. A continuing educational program, coupled with uniform application of the law, must be instituted to stimulate interest and a desire to maintain standards. Smaller repeat classes should be made a part of a total program. The follow-up type of classes may be planned on the basis of equipment or specific problems, or on an occupational basis, such as meetings for waitresses, cooks, dishwashers, bartenders, and soda fountain workers.

A group may ask for a roundtable discussion of how to get rid of pests, or on devices for keeping food safe from hands and dirt. In any case, it is important to find out in advance exactly what it is that the members of a group wish to know so as to avoid wasting their time and yours. By doing this you will have at hand the information, the material, or the expert most helpful for meeting their needs.

Health department cooperation along educational lines with the operators and employees of eating and drinking establishments has achieved greater compliance with health regulations than straight enforcement measures have in the past. This is fortunae, for as the people themselves become more public health-minded, they are going to insist upon the greatest possible protection.

Appendix D. Bibliography

A source of reference books, pamphlets, periodicals, and other literature relative to public health is essential to the continued successful operation of a health agency. This source becomes more valuable in order to keep informed about the current developments in your special field of interest. There is no more important place where the most recent knowledge is needed than in the field of training, since those responsible for training should always be teaching the most current information on the subject for which they are responsible.

If an agency responsible for a food protection program in a community has not established a library of reference books on food sanitation, they are encouraged to begin one at the earliest possible date. Establishing a library need not be a large segment of the program budget since it can be established with but a few of the basic references in food sanitation. At regular intervals, additional and more specific references, as well as periodicals, should be acquired. In this manner, as new knowledge is presented, it will be available for use.

A library, to be of benefit, must be used; therefore, it must be accessible to those who use it, and the entire agency staff, as well as the training program personnel, should be encouraged to make use of the material it contains.

The following list of reference books, periodicals, and other publications relate generally and specifically to food protection. Many of those listed are standard references in the food protection field whereas others will provide a source of specific information to assist in developing additional course material to expand or supplement that given in the Lesson Manuscripts.

BOOKS AND PUBLICATIONS

Adams, H. S.
Milk and Food Sanitation Practices, 1947
Harvard University Press
Cambridge, Mass.

American Public Health Association
Recommended Methods for the Microbiological Examination of Foods, 2nd Edition, 1966
1790 Broadway
New York, N. Y. 10019

Ayres, J. C., et al., Editors
Chemical and Biological Hazards in Food, 1962
Iowa State University Press
Ames, Iowa 50012

Baking Industry Sanitation Standards Committee
BISSC Sanitation Standards for Bakery Equipment
521 Fifth Ave.
New York, N. Y. 10017

Birkland, J.
Microbiology and Man, 2nd Edition, 1949
Williams and Wilkins Co.
428 East Preston St.
Baltimore, Md. 21202

Bulago, G., Jr., and L. Grant
Attitudes About Sanitation in Restaurants
Research Bulletin No. 64, May 31, 1966
Department of Psychology
Pennsylvania State University,
University Park, Pa. 17774

Charm, S. E.
The Fundamentals of Food Engineering, 1963
The AVI Publishing Company, Inc.
Westport, Conn. 06881

Cockburn, W. C., et al.
Food Poisoning, 1962
The Royal Society of Health
90 Buckingham Palace Rd.
London, S. W. 1, England

Dack, G. M.
Food Poisoning, 3rd Edition, 1956
University of Chicago Press,
Chicago, Ill. 60610

Desrosier, N. W.
The Technology of Food Preservation, 1963
Revised and Augmented Edition
The AVI Publishing Company, Inc.
Westport, Conn. 06881

Dewberry, E. B.
Food Poisoning, 4th Edition, 1960
London L. Hill, Ltd.
17 Stratford Pl.,
London, W. 2, England

Ehlers, V. M., and E. W. Steel
Municipal and Rural Sanitation, 6th Edition, 1965
McGraw-Hill Book Co.,
New York, N. Y. 10036

Frazier, W. C.
Food Microbiology, 1958
McGraw-Hill Book Co.,
New York, N. Y. 10036

Friedman, B.
Sanitarian's Handbook: Theory and Administrative Practice, 1965
Peerless Publishing Co.,
515 Lafayette St.
New Orleans, La. 70100

Gordon, J. E., Editor
Control of Communicable Diseases in Man,
American Public Health Association
1790 Broadway
New York, N. Y. 10019

Grad, F. P.
Public Health Law Manual, 1965
American Public Health Association
1790 Broadway
New York, N. Y. 10019

Graham-Rack, B., and R. Binstead
Hygiene in Food Manufacturing and Handling, 1964
Food Trade Press, Ltd.
7 Garrick St.
London, W.C., 2, England

Hanlon J. J.
Principles of Public Health Administration, 3rd Edition, 1961
C. V. Mosby Co.,
St. Louis, Mo. 63100

Herms, W. B.
Medical Entomology, 5th Edition, 1961
Revised by M. T. James,
MacMillan Co.
New York, N. Y. 10011

Hobbs, B. C.
Food Poisoning and Food Hygiene, 2nd Edition, 1968
Edward Arnold and Co.
London, England

Hopkins, E. S., and W. H. Schulze
The Practice of Sanitiation, 3rd Edition, 1958
The Williams and Wilkins Company
Baltimore, Md. 21202

International Association of Milk, Food and Environmental Sanitarians, Inc.
Procedures for the Investigation of Foodborne Disease Outbreaks
2nd Edition, 1966
Box 437
Shelbyville, Ind. 46176

International Association of Milk, Food and Environmental Sanitarians, Inc.
3-A Sanitation Standards for Equipment
Box 437
Shelbyville, Ind. 46176

Kotschevar, L. H., and M. E. Terrell
Food Service Planning: Layout and Equipment, 1961
Wiley and Sons, Inc.
New York, N. Y. 10016

Longree, Karla
Quantity Food Sanitation, 1967
Interscience Publishers
New York, N. Y. 10001

Mallis, A.
Handbook of Pest Control, 4th Edition, 1964
MacNair-Dorland Co.
254 West 31st St.
New York, N. Y. 10001

Manufacturing Chemists' Association, Inc.
Food Additives: What They Are/How They Are Used, 1961
1825 Connecticut Ave.
Washington, D. C. 20009

Maxey-Rosenau, Edited by P. E. Sartwell
Preventive Medicine and Public Health, 9th Edition, 1965
Appleton-Century-Crofts, Inc.
New York, N. Y.

McCulloch, E. C.
Disinfection and Sterilization, 1945
Lea and Febiger
Philadelphia, Pa. 19100

Parker, M. E.
Food Plant Sanitation, 2nd Edition, 1964
McGraw-Hill Book Co.
New York, N. Y. 10036

Phelps, E. B.
Public Health Engineering—A Textbook of the Principles of Environmental Sanitation, 2 vols., 1950
Wiley and Sons, Inc.
New York, N. Y. 10016

Salvato, J. A.
Environmental Sanitation, 1958
Wiley and Sons, Inc.
New York, N. Y. 10016

Scheider, N. F., et al.
Commercial Kitchens, 1962
American Gas Assoc.
420 Lexington Ave.
New York, N. Y. 10017

Slanetz, L. E., et al., Editors
Microbiological Quality of Foods, 1963
Academic Press, Inc.
New York , N. Y. 10003

Tanner, F. W., and L. P. Tanner
Food-Borne Infections and Intoxications, 2nd Edition, 1953
Garrard Press
Champaign, Ill. 61820

Tanner, F. W.
The Microbiology of Foods, 2nd Edition, 1944
Garrard Press
Champaign, Ill. 61820

Weiser, H. H.
Practical Food Microbiology and Technology, 1962
AVI Publishing Company, Inc.
Westport, Conn. 06881

West, B. B., L. Wood, and V. F. Harger
Food Service in Institutions, 4th Edition, 1966
John Wiley and Sons, Inc.
New York, N. Y. 10016

National Academy of Sciences-National Research Council
Food Protection Committee of the Food and Nutrition Board
An Evaluation of Public Health Hazards from Microbiological Contamination of Foods, 1964
Publication No. 1195
National Academy of Sciences
2101 Constitution Ave., N. W.
Washington, D. C. 20418

National Academy of Sciences-National Research Council
The Use of Chemicals in Food Processing, Storage, and Distribution, 1961
Publication No. 887
National Academy of Sciences
2101 Constitution Ave., N. W.
Washington, D. C. 20418

National Association of Sanitarians
Sanitarian's Desk Reference, 1962
1550 Lincoln St.
Denver, Colo. 80203

National Fire Protection Association, International
Ventilation of Cooking Equipment, 1964, NFPA No. 96
60 Battery March St.,
Boston, Mass. 02110

National Restaurant Association
Educational Materials Center
1530 North Lake Shore Dr.
Chicago, Ill. 60610

- *Foodborne Illnesses—Technical Bulletin*
- *Know Your Health Officer*
- *Pest Prevention—Technical Bulletin*
- *A Food Protection Message for Food Service Operators*
- *Cold Facts About Food Protection* (an adaption of PHS Publication 1247)
- *Hot Tips About Food Protection* (an adaption of PHS Publication 1404)

National Sanitation Foundation
P. O. Box 1468
Ann Arbor, Mich. 48106

- *Food Vending Machines*, Basic Criteria C-1
- *Evaluation of Special Equipment and/or Devices*, Basic Criteria C-2
- *Soda Fountain—Luncheonette Equipment and Appurtenances*, Standard No. 1
- *Food Service Equipment*, Standard No. 2
- *Descriptive details for the guidance of technical and supervisory personnel for use in connection with NSF Standard No. 2, "Food Service Equipment"*
- *Commercial Spray-Type Dishwashing Machines*, Standard No. 3
- *Commercial Cooking and Warming Equipment*, Standard No. 4
- *Commercial Gas Fired and Electrically Heated Hot Water Generating Equipment*, Standard No. 5
- *Dispensing Freezers*, Standard No. 6
- *Food Service Refrigerators and Food Service Storage Freezers*, Standard No. 7
- *Commercial Powered Food Preparation Equipment*, Standard No. 8
- *Automatic Ice Making Equipment*, Standard No. 12
- *Manual Food and Beverage Dispensing Equipment*, Standard No. 18
- *Commercial Bulk Milk Dispensing Equipment and Appurtenances*. Standard No. 20

National Sanitation Foundation Testing Laboratory, Inc.
Seal of Approval Listing of Food Service Equipment (Revised each year)
Ann Arbor, Mich. 48106

Paper Cup, Container and Doily Institute, Inc.
(Posters and Informational Brochures)
250 Park Ave.
New York, N. Y. 10017

Numbered U. S. Government publications may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402

U.S. Department of Agriculture

Agricultural Marketing Service
A Guide for Planning and Equipment School Lunchrooms, June 1956
Publication No. PA 292
$0.35 per copy

Food—Yearbook of Agriculture, 1959
$2.25 per copy

Insects—Yearbook of Agriculture, 1952
$2.50 per copy

Protecting Our Food—Yearbook of Agriculture, 1966
$2.50 per copy

U.S. Department of Health, Education, and Welfare

Food and Drug Administration
Microscopic-Analytical Methods in Food and Drug Control
Food and Drug Technical Bulletin No. 1
$2.00 per copy

Office of Education
Food Service Industry Training Program and Facilities, 1961
OE Publication No. 82007
$ .65 per copy

Public Health Service
W. J. Hayes, Jr.
Clinical Handbook on Economic Poisons, Revised 163
PHS Publication No. 476
$0.55 per copy

Public Health Service
National Communicable Disease Center
Insect Control Series
PHS Publication No. 772

Part I : *Introduction to Arthropods of Public Health Importance*, $0.30
Part II : *Insecticides for the Control of Insects of Public Health Importance*, $0.25
Part III : *Insecticidal Equipment for the Control of Insects of Public Health Importance* $0.25
Part IV : *Sanitation in the Control of Insects and Rodents of Public Health Importance*, $0.25
Part V : *Flies of Public Health Importance and Their Control*, $0.25

Part XII : *Household and Stored-Food Insects of Public Health Importance and Their Control,* $0.40

Public Health Service
National Communicable Disease Center
Lecture Preparation Guide, 1966
PHS Publication No. 1421
$0.50 per copy

Public Health Service
National Communicable Disease Center
Proceedings of the National Conference on Salmonellosis, March 1964
PHS Publication No. 1262
$1.50 per copy

Public Health Service
Botulism—Proceedings of a Symposium, Jan. 1964
PHS Publication No. 999-FP-1
Publications Office
Environmental Control Administration
Cincinnati, Ohio 45202

Public Health Service
Report on Public Health Pesticides (current annual edition)
Biology/Chemistry Section, Technology Branch
National Communicable Disease Center
P.O. Box 769
Savannah, Ga. 31402

Public Health Service
Control of Domestic Rats and Mice, Training Guide—Rodent Control Series
National Communicable Disease Center
Atlanta, Ga. 30333

Public Health Service
Rodent Eradication and Poisoning Programs, Training Guide—Rodent Control Series
National Communicable Disease Center
Atlanta, Ga. 30333

Single free copies of the following publications may be requested from the Environmental Control Administration, Public Health Service, U. S. Department of Health, Education, and Welfare, Cincinnati, Ohio 45202

Larger quantities may be ordered from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

Hot Tips on Food Protection, 1966
PHS Publication No. 1404
$0.10 per copy, $5.00 per hundred

Cold Facts About Home Food Protection, 1964
PHS Publication No. 1247
$0.05 per copy, $2.50 per hundred

You Can Prevent Foodborne Illness, 1963
PHS Publication No. 1105
$0.05 per copy, $2.50 per hundred

From Hand to Mouth, Revised 1961
PHS Publication No. 281
$0.20 per copy

A Sanitary Standard for Manufactured Ice
1964 Recommendations of the Public Health Service
PHS Publication No. 1183
$0.15 per copy

Food Service Sanitation Manual
1962 Recommendations of the Public Health Service
PHS Publication No. 934
$0.55 per copy

Grade "A" Pasteurized Milk Ordinance
1965 Recommendations of the Public Health Service
PHS Publication No. 229
$1.25 per copy

PERIODICALS

American Journal of Public Health
American Public Health Association
1740 Broadway
New York, N. Y. 10019

American Journal of Veterinary Research
American Veterinary Medical Association
600 South Michigan Ave.
Chicago, Ill. 60605

American Restaurant Hospitality
Patterson Publishing Co.
American Restaurant Magazine
5 South Wabash Ave.
Chicago, Ill. 60603

Applied Microbiology
Williams and Wilkins Co.
428 E. Preston St.
Baltimore, Md, 21202

Association of Food and Drug Officials of the U.S., Quarterly Bulletin
Evan Wright, Division of Food and Drug Inspection
Kansas State Department of Health
Topeka, Kan. 66612

Bacteriological Reviews
American Society of Microbiology
428 E. Preston St.
Baltimore, Md. 21202

Bulletin of Hygiene
Bureau of Hygiene and Tropical Diseases
Keppel St. Gower St.
London, W. C. 1, England

Canadian Journal of Public Health
Canadian Public Health Association
150 College St.
Toronto 5, Ontario, Canada

Food Engineering
Chilton Co.
Chestnut and 56th Sts.
Philadelphia, Pa. 19100

Food Processing and Marketing
Putnam Publishing Co.
111 E. Delaware Pl.
Chicago, Ill. 60611

Food Service
Food Service Magazine
2132 Fordam Ave.
Madison, Wisc. 53700

Food Technology
The Garrard Press
119-123 W. Park Ave.
Champaign, Ill. 61820

Health Officers' News Digest
Public Health Committee of the Paper and Cup Container Institute
250 Park Ave.
New York, N. Y. 10017

Institutions Magazine
Domestic Engineering Center
1801 Prairie Ave.
Chicago, Ill. 60616

Journal of the American Dietetic Association
American Dietetic Association
620 N. Michigan Ave.
Chicago, Ill. 60610

Journal of the American Medical Association
American Medical Association
535 N. Dearborn St.
Chicago, Ill. 60610

Journal of the American Veterinary Medical Association
American Veterinary Medical Association
600 S. Michigan Ave.
Chicago, Ill. 60605

Journal of the Association of Official Agricultural Chemists
Association of Official Agricultural Chemists
Box 540, Benjamin Franklin Station
Washington, D. C. 20044

Journal of Bacteriology
Williams and Wilkins Co.
428 E. Preston St.
Baltimore, Md. 21202

Journal of Environmental Health
National Association of Sanitarians
1550 Lincoln St.
Denver, Colo. 80203

Journal of Food Science
The Garrard Press
119-123 W. Park Ave.
Champaign, Ill. 61820

Journal of Milk and Food Technology
International Association of Milk, Food and Environmental Sanitarians, Inc.
Box 437
Shelbyville, Ind. 46176

Lancet
British Publications
30 East 60th St.
New York, N. Y. 10022

Pest Control Magazine
Trade Magazines, Inc.
1900 Euclid Ave.
Cleveland, Ohio 44100

Public Health Reports
U.S. Department of Health, Education, and Welfare
Public Health Service
Superintendent of Documents
Government Printing Office
Washington, D. C. 20402

Science
American Association for the Advancement of Science
1515 Massachusetts Ave. N. W.
Washington, D. C. 20005

☆ U.S. GOVERNMENT PRINTING OFFICE: [illegible] O—[illegible]